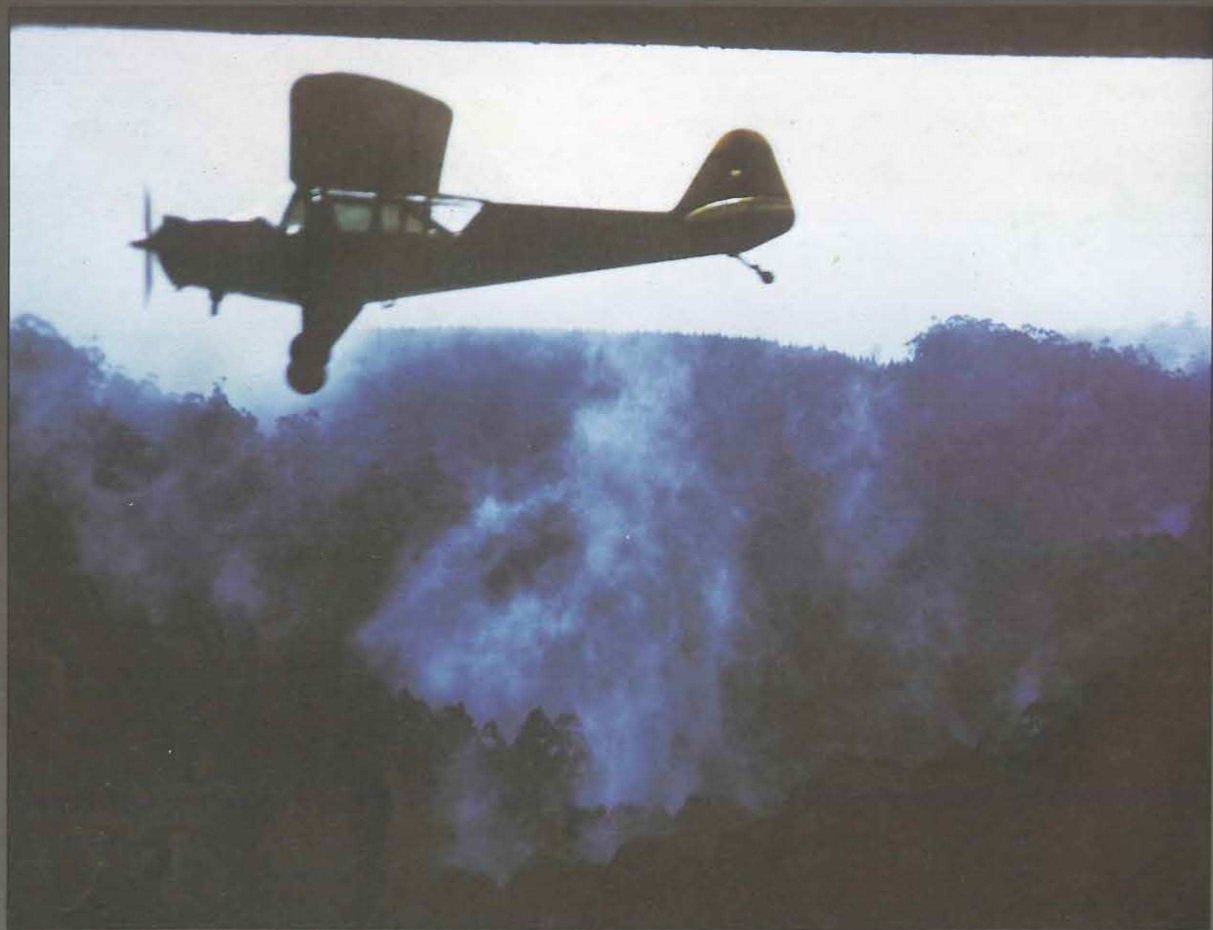
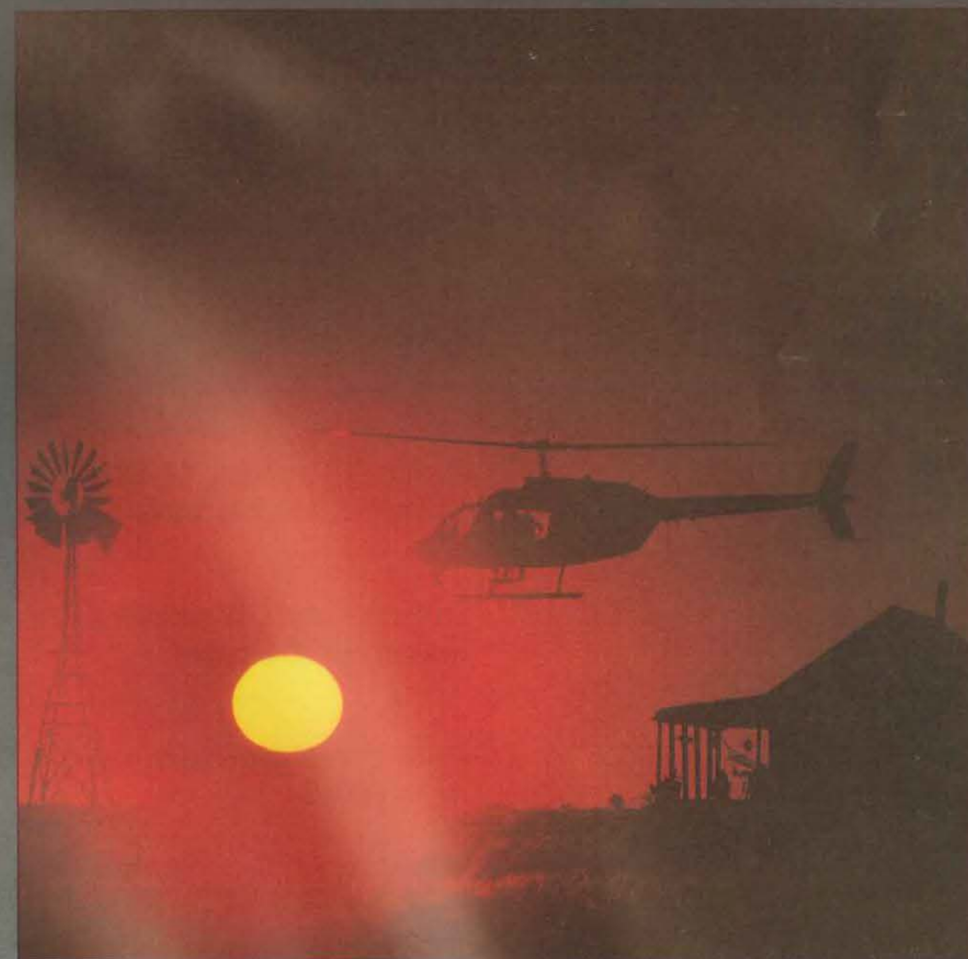


AVIATION SAFETY DIGEST



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Contents

Statement by Ron Cooper

General Manager, Safety Regulation and Standards Division

THE RESULTS of the survey we conducted to identify readers' wishes in relation to the continuation of the *Digest*, indicated inadequate support to warrant its continuation. However, the CAA believes there is a need for the promulgation of information from time to time, and intends to provide that information in an enhanced version of the CAA News. I am sure that this publication, together with the BASI Journal, will provide an appropriate source of safety information for the aviation industry.

Editorial

FOR SOME TIME, we have been aware that the wide interest displayed in the 'Accident and Incident Summary' merited better presentation of this material. Our efforts have resulted in the 'Air Safety Digest'.

This momentous Foreword launched the initial issue of the Aviation Safety Digest in July 1953; we like to think the standard, of proof-reading at least, has been maintained. Now, as a result of the recent review of CAA resources, it has been decided that the publication in its traditional form is not the most appropriate vehicle for the propagation of aviation safety information.

ASD 1 contained articles on cockpit design and safety; refuelling from drums; manual feathering; accidents in starting engines; and selected overseas and Australian accidents and incidents. In this, the one hundred and fiftieth and final *Digest*, there are articles on the new Australian airspace arrangements; aircraft handling; airmanship (twice); bogus parts; unlicensed flying; sunglasses; various Australian accidents, plus a few readers opinions — a fair cross-section of the day-to-day business of safety in the air. Incidents, of course, are covered by the *BASI Journal*.

Naturally, it is sad to see the termination of *ASD*, because over the years we have honestly welcomed the vigorous support, informed interest, trenchant criticism and, on occasion, praise that has come our way from what must be one of the most lively readerships a magazine could have. Thirty-eight years on, the Australian industry can look forward to a different approach to aviation safety education, and you should not for a moment think that the CAA is seeking to avoid any responsibility, legal or moral — it is merely a case of new times bringing new methods. Those readers who have active subscriptions to *ASD* will automatically be included in the mailing list for the new publication.

Elsewhere in this edition is a report on the *ASD/NIKON Photographic Competition 1991*. One of the winners, Lindsay Stepanow of Ballarat, who has owned and flown a Victa Airtourer 100 since 1975, felt moved (not just because of the prize) to include these remarks in his acceptance speech:

. . . as for the Safety Digest, it's been a constant with pilots over the decades. Rules, charges and aeroplanes may change over the years, but ASD has always been there. It dispenses advice that on occasion may seem obvious (sometimes you think 'Bloody fool! How'd he get his licence?'), but most of the time you think 'Gee, I'm glad someone told me about that before it happened to me'. The magazine gives you more of a chance to combat the cruel tricks that Fate and Nature can play, and for the non-professional pilot, whose experience and currency levels may be variable, it is a way to acquire constant up-dating of aviation knowledge, particularly through the hard-earned experience of others.

We couldn't ask for a more appropriate or more generous epitaph.

It's been a pleasure doing business with you all, so safe flying and keep on checking your six.

Editor:		*Roger Marchant*
Sub-Editor:		*Lyn Coutts*
Diagrams:		*Soussanith Nokham*
		Kathy Arnold
Cartoon Diagrams:		*Ross Buxton*
Photographs:	*P4*	*BASI File Photo*
	P8	*BASI File Photos*
	P24	*RAAF File*
	P25	*Lyn Coutts*

To feather or not to feather?

— gear-up landings in light twins

Dick Reynoldson, Flying Operations Inspector

THIS ARTICLE was prompted by the BASI accident report on the Piper PA34-200, to be found elsewhere in this magazine.

In light twin engined aircraft fitted with two bladed propellers, a landing gear malfunction brings with it special considerations and temptations not experienced in aircraft having propellers with more than two blades. In theory, if such an aircraft has to make a gear-up emergency landing it should be possible to feather both propellers prior to touchdown and by use of the starter motor rotate them to a horizontal position, thus avoiding ground contact and expensive propeller and engine damage. Unfortunately, as a lot of unfortunate pilots have found, putting the theory into practice presents a greater problem than might be expected. Economic pressure and the temptation to 'give it a try' in an endeavour to minimise the cost of repairs or time out of service can be strong inducements to attempt a procedure which may well be beyond the pilot's capability. The BASI report is typical of similar occurrences over the years, some of which have also been documented in past issues of *ASD*.

One can only sympathise with the pilot, who, in a difficult situation not of his own making, was doing his best to save his aircraft from suffering extensive damage. Alas, he attempted something that other pilots have also found to be beyond their level of skill and although in this case there were no injuries, others have not been so fortunate. Some years ago the pilot of a PA23 with an undercarriage malfunction attempted a similar procedure but the propeller failed to fully feather prior to touchdown and ground contact was made with the blades still rotating and in a near-feathered position. Propeller blades in normal pitch bend back fairly easily as they contact the ground but in the feathered position (ie with chord parallel to the line of flight) they are much stronger and do not bend easily or at all on ground contact. In this instance the blades did not bend, but dug into the ground and the aircraft was tipped over on its back as it touched down. A passenger subsequently died from injuries received.

The lesson here is that not only does the procedure involve high risk to both pilot and passengers but also the number of unsuccessful attempts over the years indicates that it is not an easy trick to pull off.

Before deciding to attempt such a tactic, here are some of the factors which the pilot should consider.

- The situation will be stressful and this will possibly affect the pilot's judgement and performance.
- The probability that this will be a 'first attempt', without prior practice or training.
- Unfamiliarity with the aeroplane's gliding characteristics in this configuration, thus increasing the possibility of a misjudged approach.
- Feathering the propeller too early may give rise to an undershoot with no power available to correct the situation.

- Feathering late or with excess speed may induce unexpected float due to the decreased drag of the feathered propellers.
- Propellers may not feather simultaneously, or at all, giving rise to unexpected yawing moments.
- The workload involved with feathering and horizontalling the propellers may (probably will) distract the pilot from the difficult task of carrying out the emergency landing.
- Once the propellers have been feathered the possibility of a go around is eliminated.

It seems fairly obvious that, for the average pilot, the odds are well and truly stacked against a successful outcome.

More significant, perhaps, is that in deciding to attempt such a procedure the pilot could well be accused of neglecting a higher priority — the safety of all those on board the aircraft. Any procedure that increases the risk of bodily injury in an emergency situation is one which requires better justification than merely attempting to avoid the cost of engine and propeller damage.

Moreover, the amount of damage the pilot is seeking to avoid need not necessarily be of catastrophic proportions. It is quite possible that an aircraft landing gently with the gear up, engines throttled back to minimum power and propellers unfeathered will suffer little more damage than some bent propeller blades. Feathered blades, if not successfully placed in the horizontal position, have the potential to cause far greater engine and airframe damage.

What procedures should a pilot adopt, then, when faced with a landing in an aircraft having some degree of landing gear malfunction? The specific answer is to be found in the Emergency Procedures section of the pilot's manual and all pilots should ensure that they are familiar with any special procedures required for their aircraft type.

However, it is possible to state some general propositions applying across a broad range of light piston engine types, which if followed should minimise risk to aircraft and occupants alike.

- In the event of a landing gear malfunction, find out as much as you can on the extent of the problem. Conduct a flypast of the tower, if possible. People on the ground may be in a better position than the pilot to ascertain if the gear is in fact down, partially down, or in fact still retracted. Use the radio to get advice on the situation from air traffic controllers, LAMEs or pilots familiar with the type.
- If, after exhausting all the possibilities for extending the landing gear, an emergency landing is inevitable, give some consideration to the quantity of fuel on board. It may be advisable to delay the landing and consume excess fuel to minimise the risk of fire in the event of a fuel tank rupture.
- Choose the landing area carefully: a firm grassed strip or foamed pavement with plenty of length and a landing direction as close as possible into wind are preferred.
- An often-asked question is whether it is better to land with the landing gear fully retracted or with it partially extended. If at least one of the main undercarriage legs is down and locked then it is probably better to have it extended. The aircraft may be landed on this leg and the wings kept level with ailerons as long as possible. This technique has the advantage of reducing to the absolute minimum the speed at which impact occurs. Remember, impact forces reduce in proportion to the square of the reduction in speed, so a small deceleration will pay great dividends.
- The use of flap is recommended in many manufacturer's manuals, as it will minimise landing speed, and any flap damage that may result is well offset by the softer impact.
- Make a normal powered approach, aiming to touch down smoothly at minimum speed, ensuring that the throttles are fully retarded. Again, some manuals recommend placing the mixture controls in idle cut off just prior to touch down but this procedure has not been shown to have significant advantage in reducing engine damage.
- Much more important is to turn off the fuel selector, electrics and ignition switches, as soon as this may be done without distracting the pilot from the task of controlling the aircraft during the landing. This will reduce the risk of fire.

All that has been said above is not meant to deprive the pilot of the prerogative of making decisions on the best course of action under particular circumstances. If the pilot is justifiably confident that no additional risk is involved, particularly to passengers, then the procedure of feathering the propellers may have merit. Should the pilot elect to proceed with this course of action, the best advice is probably:

- when on final and assured of a landing, feather and place **one propeller only** in the horizontal position; then
- reassess the situation to ensure that the intended landing area is within comfortable gliding distance before attempting to feather the second propeller

While it cannot be denied that pilots have successfully carried out landings in the past with both engines feathered, evidence is that it is a dangerous procedure for the average pilot because the associated risks involved far outweigh any benefits to be gained in terms of minimising damage. In fact, the evidence shows that often the outcome has been damage far in excess of that occurring had a normal approach and landing with power been attempted, not to mention the unnecessary additional hazards to the pilot and passengers □

'Remain clear of cloud and in sight of ground/water...'

Terry Walls, Manager Pilot Education, AMATS Project, CAA

THE TITLE of this article uses a common phrase passed to VFR pilots by ATC when conditions in a Control Zone require reduced clearance from cloud. It enables pilots to operate in conditions which otherwise would be in breach of the VMC minima. Many thousands of flights are conducted safely in this manner each year.

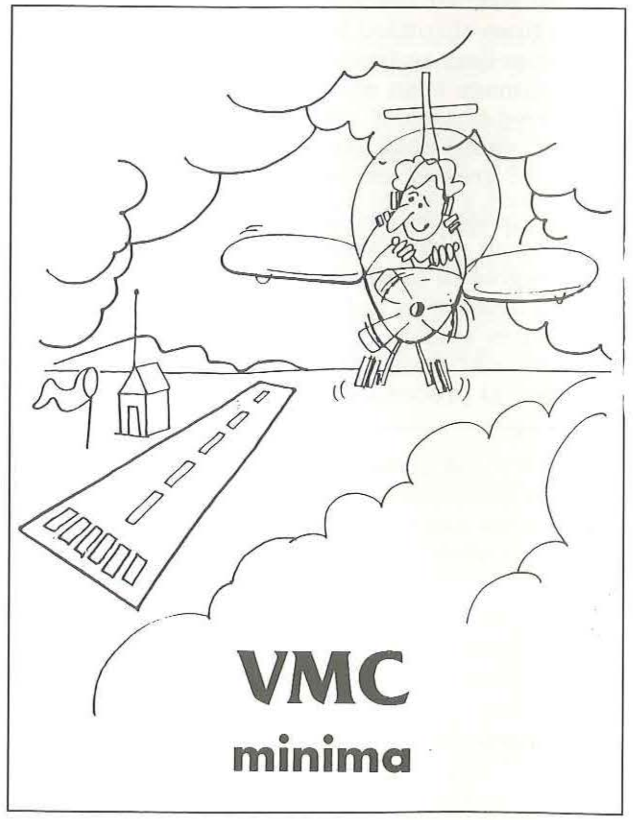
Some years back I was in an aero club and a pilot was talking to the CFI about the marginal weather conditions which were interfering with his planned holiday flight to another State. His wife and three-year old daughter were hanging back whilst the CFI was giving the pilot some advice about a Special VFR clearance from the Control Zone and then the best plan of attack to reach clearer weather. I was a bit taken back when the mother said to the little girl in answer to a question about when they were going to leave, *See those clouds out there darling ? Well if Daddy flies into them, we will crash and die!*

I don't know what happened to the child's confidence about flying in light aircraft but it did draw my attention the fact that the pilot was doing everything he could to ensure that his flight would be safe. It also made me think about my own training in this respect. I realised that I had developed quite a fear of flying too close to cloud because most of my training had been in good weather and the many stories I had read in the *Digest* or had heard concerning weather-related accidents attributed to VFR pilots who entered IMC and lost control or collided with terrain.

Some years later, when I joined the Bureau of Air Safety Investigation, I checked on the actual figures and was surprised to discover that Australia only experienced about two or three such accidents a year. They were, however, invariably fatal accidents and received significant media coverage. With more experience I overcame my anxiety and decided that flying 'marginal VMC' can be quite safe given that you understand your own and your aircraft's limitations and avail yourself of local knowledge.

Why haven't pilots been given the same opportunity to use their skills and discretion to fly Special VFR in a similar manner OCTA? Seems like a reasonable question and, in fact, I'm sure there are many pilots who have reduced their clearance from cloud due force of weather yet continued to conduct a safe operation.

Well, the good news is that from 12 December the rules will be changed to enable pilots to remain clear of cloud when operating below 3 000 ft AMSL or 1 000 ft AGL provided they have 5 km visibility and carry and use radio. The changes to the VMC minima also include provision for flight above and below 10 000 ft both in and outside controlled airspace.



Inside controlled airspace:

Above 10 000 ft in CTA with 8 km visibility — remain clear of cloud

Below 10 000 ft with 5 km visibility, remain either at least 1 000 ft above cloud or 500 ft below.

Outside controlled airspace:

Above 10 000 ft with 8 km visibility — maintain 1500 metres horizontal separation from cloud and 1 000 ft above or 500 ft below.

Below 10 000 ft — as above, but only 5 km visibility required

Below 3 000 ft AMSL or 1 000 ft AGL — remain clear of cloud.

The introduction of the 'clear of cloud rule' enables pilots to exercise the same skills which they obviously demonstrate when flying Special VFR in controlled airspace to marginal VFR conditions OCTA.

However, the pilot can only take advantage of these lower standards if the aircraft is carrying radio and the pilot has 5 km visibility. There is often good operational reason to fly 'closer to the soft stuff than the hard stuff'. However, pilots need to be conscious of other aircraft which may be flying an approach in IMC. Therefore, the CAA has made it mandatory for pilots to carry and USE radio. Radio is an essential element in obtaining an appreciation of potential traffic conflicts.

Also pilots should plan flight into marginal VMC carefully.

- Slow the aircraft down. There is no point in going flat chat if visibility is down to 5 km. It just reduces the margins further.
- Ensure that you have a thorough appreciation of the total weather picture. Check with Flight Service. Marginal VMC in the area you are flying at the time may be quite safe, but if 20 miles up your track there are embedded Charlie Bravos, it's time to exercise discretion and make a smart 180.
- Have passengers look out for other traffic, particularly as you approach terminal areas.
- Navigate accurately and always have an escape route worked out.

The CAA produced an excellent safety awareness video last year called *Going Too Far — A Pilot's Guide to VMC*. This contains many hints to help you judge correctly whether to fly in marginal VMC. It should be available from any flying training organisation, and is well worth the 20 minutes viewing time ☐

'Try to remember the 12th of December...'

..because this is the sort of thing that will be happening to and in Australian airspace:

- **the lower limit of Australian Continental CTA will remain at FL245;**
- **the ICAO hemispherical cruising levels will be introduced, ie West evens — East odds (+ 500 ft for VFR);**
- **IFR will receive traffic on other IFR traffic;**
- **VFR Full Reporting flight notifications will no longer be available;**
- **flight notification will not be required for VFR GA flights (but remember that you will still require a clearance to enter controlled airspace);**
- **common Traffic Advisory Frequencies (CTAF) will be introduced at all licensed aerodromes, broadcast ALAs and broadcast areas;**
- **AFIZ will become Mandatory Traffic Advisory Frequency (MTAF) areas;**
- **FS will not be monitoring CTAF and MTAF;**
- **clearances to operate in controlled airspace will be provided direct by ATC rather than through FS;**
- **radar advisory trials will be taking place near Adelaide and Melbourne; and**
- **new VMC Minima will apply including 'clear of cloud' below 3 000 ft AMSL or 1 000 ft AGL when 5 km visibility applies and radio is carried and used ☐**

Accident response

Cessna 182, 6 November, 1990

The pilot, accompanied by two employees, was carrying out an aerial inspection of a harvesting operation in a large open paddock. The aircraft had approached from the north, flying at approximately 150 ft above ground level, and carried out a right hand orbit. It then proceeded for a short distance in a southerly direction before entering a steep descending turn to the left towards a three-wire powerline positioned north-south across the paddock, the spans of which were approximately 300 ft above ground level.

Approaching the powerline, the aircraft was observed to climb rapidly, and a noise like a breaking stick was heard as the left wingtip contacted the centre wire of the powerline, which remained intact. The aircraft continued to climb steeply to about 80 ft above ground level. It faltered momentarily before tail-sliding and impacting the ground 100 metres east of the powerline. The aircraft impacted on its left wing and nose. It bounced a further 25 metres while turning inverted and became engulfed in a ball of fire, which reduced it to ashes.

In 1988, the pilot had received a serious head injury, which was considered by the CAA Aviation Medicine Branch to constitute a failure to meet the required medical standards for a renewal of his licence. An appeal was lodged against this decision and a review was conducted, with a request that the pilot supply further medical evidence. Responses by the pilot were inadequate, but further evidence obtained by the CAA suggests it would be logical to suspect the pilot's judgement and temperament had been affected by the injury, and that a review board would have probably continued to oppose the reissue of his licence. During this period, he continued to fly his aircraft, and was still operating without a valid licence at the time of the accident.

Significant factors:

- the pilot was conducting a low-flying exercise;
- the aircraft struck a powerline;
- the aircraft stalled at a height from which it was too low to effect a recovery; and
- the pilot's judgement may have been affected by a previous head injury.

Cessna 172-N 1 July, 1989

A pilot, who is based at Lake Evella, was on the scene soon after the accident occurred. He located the PIC, who conveyed the following sequence of events.

Take-off was commenced from the threshold of the strip and the aircraft was being flown by the pilot under instruction. It lifted off further down the strip than the instructor expected, then commenced climbing at 80 kts. Very shortly after lift-off the engine suffered a partial power loss.

The instructor took control of the aircraft, checked fuel contents and saw that the mixture was rich. He then closed the throttle and lowered full flap because he would have to land the aircraft on the remaining runway/overrun area. He then assessed that he could not land in the available cleared area ahead, so he turned right into wind and looked for a cleared area into which to land. The aircraft then flew into trees, striking several large trees before impacting with the ground at a low speed.

The instructor said that he and probably the surviving passenger were thrown clear of the aircraft during the impact sequence. Both, however, were badly burned.

The investigation focussed on an attempt to determine the reason for the engine malfunction.

One possibility considered was that the take-off was commenced with the fuel selector in the 'OFF' position. This was considered possible because the student pilot had learned to fly overseas and may have been trained to switch the fuel selector off during the shut-down checks [*that had preceded this flight*]. The operator's normal procedure was to leave the fuel selector 'ON' after engine shutdown. Another possibility was that the instructor may have turned the selector to 'OFF' in order to check the thoroughness of the student's pre-start checks.

The fuel selector was badly damaged by fire, but it was determined that the selection made, though slightly displaced from the 'BOTH' position, would not have affected the fuel supply to the engine. A trial using the same model aircraft was made, in order to estimate how far into the take-off run it would get if the engine was started with the fuel selector in the 'OFF' position. The engine failed due fuel starvation after idling for 1′05″ at 1000 RPM.

It was considered that, because of the distance of the tarmac area from the threshold of the runway used for departure, the engine would have stopped before take-off could have been commenced. The hypothesis that the selector was in the 'OFF' position was therefore discounted.

The engine was dismantled and examined to determine pre-impact serviceability. No defect was discovered that could have caused either partial of complete failure. However, the investigation was impeded by the extensive post-impact fire damage to the components of the engine. Parts of the air induction system and carburettor were destroyed, although some testing was possible. The magnetos were damaged to an extent where meaningful examination was impossible. Therefore a malfunction of the vital components of the engine cannot be discounted.

Loss of power occurred when the aircraft was approximately 100 ft above ground level. From such a height it is not possible to turn back and land on the departure runway, and in this case there was insufficient runway remaining ahead to land back on. The strip is surrounded by trees, which meant that there was no suitable area for a forced landing within gliding distance.

Significant factors:

- the engine lost power very shortly after take-off for reasons which could not be determined; and
- there was no suitable area within gliding distance for a forced landing.

The subsequent Coronial Enquiry found that the PIC of the aircraft had contravened CAR 249, in that he allowed passengers aboard what was a training flight for the purpose of the student pilot obtaining a licence. CARs 233, 235 and 244 were also in breach when the PIC allowed an overloaded aircraft to attempt take-off and neglected to ensure that proper run-up and magneto tests were performed upon the engine.

The Coroner also found the PIC negligent in failing to apply first priority to aircraft control, and in turning the aircraft through 90 degrees rather than landing straight ahead.

The CAA was directed to ensure that it made it unambiguously clear to all flying instructors that any person undertaking flying lessons for the purpose of obtaining any Australian flying licence should be treated as practice for the issue of a PPL (the Coroner excluded practice for the CPL).

CAA response:

The Assistant General Manager, Flying Operations (Mr Trevor Thomas) has written to all flying schools telling them of the circumstances of this accident and of the Coroner's findings. The letter encourages CFIs to ensure compliance with the Regulations.

Piper PA34-200, 27 Feb 89

After take-off the pilot had selected gear up. During climb, about 1 600 ft, he noticed that the red gear unsafe light was still illuminated and, by checking the nacelle mirror, that the nosegear was still extended. The wheel also appeared to be turned at an angle. The aircraft returned to Bankstown where it was observed that the nosewheel was turned through 80 degrees to the right. Use of full rudder travel and cycling failed to produce any change in the position of the nosegear, although the main gear retracted and extended normally.

After seeking engineering advice, the pilot elected to land on grass and an area was prepared to the left of and parallel to Rwy 11L. He advised that he intended to shutdown engines on late final and position the propellers to preclude ground contact on landing. At about 200 ft on final approach he closed both mixtures, but had insufficient time to re-position the propellers. The aircraft dropped with a high sink rate and touched down 110 metres short of the intended landing area. On initial ground contact, the left main gear pushed up through the wing and broke off. The aircraft slewed to the left and the nose wheel broke off during the 85 metre ground slide.

It was found that the right hand nose wheel steering stop had been sheared, probably during ground handling operations. This resulted in detachment of the tiller roller from the steering channel and bending of the torque link pivot bolt. The torque link subsequently failed across the pivot bolt hole, allowing the nose leg to turn approximately 80 degrees.

Significant factors:

- Rough ground handling by persons unknown, resulting in damage to the nosegear mechanism;
- Over-concentration by the pilot in attempting to manipulate the position of the propellers; and
- Pilot failed to maintain sufficient speed on approach, resulting in undershoot and heavy landing.

BASI Recommendations:

This is another example of a pilot causing a more serious accident by attempting to do 'the right thing'. For many types of emergencies, no guidance is given by the manufacturer. It is recommended that the CAA publish an article in ASD on the landing techniques to be employed with certain undercarriage malfunctions, such as defective nose gear.

CAA Response:

See article in this edition concerning emergency landings in light twins.

Kavanagh Hot Air Balloon E-260, 13 August 1989

Two hot air balloons, VH-WMS and the subject balloon VH-NMS, were involved in a collision 14 km SSE of Alice Springs Airport on 13 August 1989 whilst operating tourist charter flights from the same launch area.

The basket of VH-WMS contacted the envelope of VH-NMS just below the velcro rip panel tearing a hole large enough for the basket of VH-WMS to enter the envelope and open the velcro rip panel of VH-NMS. The degree of damage to VH-NMS was such that the balloon could not remain inflated and, consequently, the basket plummeted to the ground. There were 13 fatalities. VH-NMS was destroyed.

The pilot of VH-WMS failed to keep adequate control of his aircraft. At the time of the collision, the pilots were not in radio contact with each other. The pilots failed to keep or could not keep an adequate lookout due to their relative positions.

VH-WMS was not fitted with the mandatory instrument package which would enable the pilot to accurately ascertain altitude and vertical movement.

The investigation did not reveal any abnormalities or defects to the balloon, its envelope material or methods of manufacture which could have contributed to the accident.

BASI recommendation

1. The CAA, in conjunction with the Australian Ballooning Federation (ABF), reassess separation requirements for manned balloons. Currently, CARs 161, 162 and 163 in Part XI, Division 1 do not address the Give Way Rule applicable to manned balloon operation.

2. In view of the certification deficiencies found in the balloon log for the accident balloon, the CAA should improve their standards of surveillance of aircraft documentation and educate Balloon Maintenance Authority holders in their responsibilities.

3. The ABF address the surveillance of instructors and examiners to ensure that the requirements for the issue of pilot certificates (balloons) are met and log book entries are certified.

Airworthiness Branch comment

The CAA has implemented the recommendation in consultation with the Australian Ballooning Federation. As a result of this accident, the following initiatives have been implemented:

- a six monthly inspection of burner and basket assemblies has been introduced;
- the log book has been revised to more accurately reflect balloon operations; and
- CAO.100.54 has been revised to tighten the CAA's requirements and this will cover the instrument package aspects.

Operations Branch comment

All recommendations are in the process of being implemented. The Authority has engaged Mr. Phil Hanson as a consultant to review all aspects of commercial ballooning operations and report back by 16 February 1990. Mr. Hanson is expected to recommend further measures to improve the training of commercial balloon pilots, the supervision of balloon operators and the recording of balloon airworthiness. Standards Development Division expects to initiate changes to legislation as a result of this review.

A revised Balloon Permit was issued pursuant to CAR 259 in December 1989. The Permit states that it is the pilot's responsibility to maintain separation between balloons. An identical wording has been adopted by the ABF in the Operations Manual for private balloon operators.

The relevant Aeronautical Information Publication is being amended in parallel with Airways Operations Instructions to incorporate a revised wording for the Air Traffic Control instruction issued to balloons operating in close proximity while in controlled airspace.

Grumman AA5B, 14 August 1989

The pilot had flown from Archerfield to Surfers Gardens ALA to pick up a passenger, and made a normal landing on runway 12. About 20 minutes later he was taxiing for takeoff on runway 12 when the nosewheel strut collapsed, and the propeller struck the ground. The ALA had only recently been reopened after having been closed for some time due to a soft wet surface. The nosewheel had entered a slight depression prior to the strut collapsing but the depression should not have been sufficient to overload the strut to the point of failure at normal taxiing speed.

Examination of the nosegear showed that the metal to metal epoxy bonding which attaches the torque tube to the airframe end fittings had failed. This failure allowed the torque tube to rotate inside the end fittings, to the extent that all normal suspension action was lost. The nosegear strut assembly then folded upwards into the engine cowls, and the propeller struck the ground. The epoxy bonding had deteriorated to the extent, that the load carrying capacity of the nosegear had been substantially reduced.

The following factors were considered relevant to the development of the accident:

1. The nosewheel entered a depression whilst the aircraft was being taxied.
2. The epoxy glue which bonds the nose landing gear torque tube to the attachment fittings failed.

BASI recommendations

The engineer involved in the recovery of the aircraft had previously experienced a similar failure on this type of aircraft. As a result he had sought assistance from the American distributor. The distributor confirmed that as a result of many USA operators experiencing similar defects, a Supplemental Type Certificate (STC) number SA3564SW, had been issued allowing modification of the torque tube and end fittings. This simple modification places taper pins through the torque tube and end fittings, effectively preventing movement even if the epoxy bonding deteriorates.

The Civil Aviation Authority should examine the above aspects with a view to recommending incorporation of a similar modification to all high-houred aircraft of this type.

Hughes 269-C Northern Territory, 17 May 1990

On a pipeline job, the pilot was making an approach to set down a passenger.

The selected alighting point was on sloping ground and the aircraft descended until the right skid touched. As he lowered the collective to rest the left skid, he felt that the slope was excessive for a landing. Accordingly, he flew the aircraft up to an in-ground-effect (IGE) hover at about four to five feet and made a left pedal turn through some 90°, to move to a more level site further downhill.

Seconds after starting to hover-taxi, the pilot reported a shudder and noticed that the main rotor RPM was decreasing. Despite the introduction of power, the helicopter continued to descend. The pilot was unable to prevent the aircraft touching down and, after a series of skips and touches, it crashed in a nose-down attitude, coming to rest on its right side. Both occupants exited without assistance through the pilot's side door.

The pilot later reported that he felt the throttle travel to its full limit and believed that he was not getting the full power output from the engine. Subsequent engineering investigation of the aircraft did not reveal any anomaly or fault that could have contributed to the accident.

Further investigation indicated that the pilot had had a poor night's sleep, due to apprehension about the forthcoming day's tasks. He also was concerned about his family situation, as he had made an unaccompanied move to gain employment. At the time of the accident, he had been flying for about seven hours.

The nature of the operation, with its frequent landings at difficult sites, was conducive to 'skill fatigue'. Skill fatigue is defined as the deterioration in performance caused by work that demands persistent concentration and a high degree of skill. It is an insidious phenomenon associated with failure of memory, judgement, integrating ability and presence of mind. Its effects may occur in conjunction with, and be accentuated by, other factors; sleep deprivation is a good example.

The prevailing conditions at the site chosen for landing were such that the helicopter was facing downwind after completion of the pedal turn and was in a high power and weight configuration. It is possible that at some stage during the turn main rotor RPM dropped. The pilot did not become aware that the rotor was in an overpitched condition until the RPM had dropped so low that full throttle would not have been sufficient to prevent ground contact. The nature of the terrain was such that a safe landing was not possible under the conditions prevailing.

The following factors are considered relevant to the development of the accident:

1. The pilot was probably suffering from skill fatigue.
2. The pilot did not realise that, under the prevailing conditions, he was close to the limits of operation of the helicopter.
3. The pilot probably overpitched the rotors at a height insufficient for recovery, in an attempt to regain control of the aircraft.
4. The terrain was such that a safe landing was not possible.

BASI recommendation

The CAA should prominently publish the circumstances and causes of this accident, for the education of helicopter pilots.

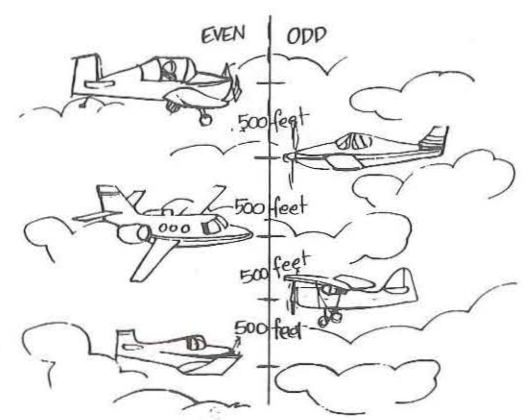
CAA Operations Branch comment

Ops Branch generally concurs with the BASI findings, adding that a helicopter operations video, planned for later this year by the CAA Safety Promotion Unit, will address this and associated problems ☐

Cruising levels and pilot decision-making

Ben Schiemer, Flying Operations Inspector, CAA

ABOUT HALF-WAY through my pilot training 'they' changed from 'The Nose Rule' (north Odds, South Evens) to the Quadrantal Rule. Therefore, for the last 26 years I've been sneaking a look at those diagrams in the south-west corner of my ERC to figure out the height I should plan to fly. How is it that if I've been pontificating on how to fly for 23 years, I don't know the cruising levels by heart? Although the conclusion may not be obvious, my colleagues have suggested it has something to do with how long I have been around; so I sneak a look at the diagrams. I will, therefore, be pleased to get a system I can readily visualise. With effect from December '91 we will all be using the ICAO hemispherical rule, which says that if you're going East you fly ODDs, and if you are going west you fly EVENs. Just add 500' if you're doing it VFR.



ICAO Cruising Levels

- 500' separation in cruise VFR/IFR
- 1000' between IFR aircraft

So what could be simpler? Even an ageing CAA flight inspector could follow that! Now the detail:

VFR cruising below five thousand

I reckon that pilots are by nature people that accept a manageable level of risk. When we fly B050 at random heights we are gambling on 'the big sky' to a certain extent — vital as it is, see and avoid is limited if we're not alerted to the likely presence of other traffic, and there's a maximum likelihood of unnotified traffic below 5 000 ft. So, although there will be times when cruising at random heights below 5 000 ft will be appropriate, and it will still be legal, I would advise you not do it unless there is an operational reason why you should. Always broadcast your intentions, so that other pilots in the area get their eyes out of the cockpit.

Visibility and Cloud Separation Criteria

The new system has changed the VMC criteria:

ICAO VMC criteria

As you see by the article by Terry Walls, ICAO says that OCTA you are to fly 1 500 m horizontally from, 1 000 ft above or 500 ft below cloud, so as to give yourself and the other pilot the option of seeing to avoid. A distinctly new feature is that below 1 000 ft AGL or 3 000 ft AMSL, you may be legal (OCTA only, and it's subject to radio requirements) if you fly clear of cloud and in sight of ground or water. You can look at this special arrangement either of two ways — it can liberate you from regulation and allow you to legally scare yourself, or it can be reserved for when it's needed and relieve you from an unfair burden of guilt-tripping. The new standard strips away a bit more regulatory constraint and permits a greater degree of pilot judgement. It doesn't aim to encourage pilots to fly around the fringes of cloud when there is no need to do so. Obviously it can be fatal to inadvertently slip into cloud near the ground, just as it is dangerous to fly so near to cloud that you can't see an aeroplane/helo/ultralight/hanglider/flock of birds coming.

It won't be legal to simply maintain clear of cloud below 3 000 ft MSL/1 000 ft AGL if you can't communicate on the relevant MTAF or CTAF.

This recognises that to fly close to cloud reduces the safety margins for all, so you have to counterbalance those margins by giving notice of where you are and what you're doing (but don't forget about the hangliders, birds and so forth).

Flight at other levels

Because see and avoid is the primary basis for VMC separation, VMC visibility is never less than 5 km, except that in recognition of assumed higher average speeds, the minimum visibility goes up to 8 km when you're above 10 000 ft. In flight you could be cruising at a nominal height separation of 500 ft from other traffic, so let's hope neither aircraft drifts up or down too much. Cruise on autopilot whenever you can.

Some hints. If you:

- have to avoid cloud try to do so by diverging horizontally rather than vertically;
- have to climb or descend, broadcast what you're doing and try to allow time for a response, and try to have an alternative strategy if, say, a climb to avoid cloud will take you into conflict with another aircraft; and
- inadvertently diverge from the appropriate cruising level, gamble positively by getting back to the right level as soon as possible rather than just drifting down/up. Never just let it sit at the wrong height.

Altimeter reliability

The altimeter can be a bit of a problem. Let me quote from a recent CAA study into accuracy levels of altimeters:

Altimeters used in VFR only operations: *the maximum indicated error shall not exceed the greater of +100 ft or 3% of the indicated altitude (representing +540 ft at 18 000 ft) or the manufacturers tolerances. Calibration is on an 'as required' basis.*

Altimeters used in IFR operations: *the indicated error shall not exceed +20 ft at MSL to 280 ft at FL500 (+180 ft at FL180). Mode C systems are required to be re-calibrated or tested every two calendar years, but no period is specified for IFR aircraft per se.*

I really do fly out there, and in both cases that last bit is what worries me. Who decides when a check is required, and who supervises that it's done properly? As things stand, the pilot/operator is the one who has to decide whether the gear is up to the job. If equipment is carried merely because the rules say so, then the operator doesn't give a hoot for aircraft safety, and probably belongs to that small group of individuals whose operation may eventually boom (in every sense). The vast majority of operators are not irresponsible and try to meet any rule they see as fair and necessary. I thus hope and trust that they will see that a good altimeter is an essential element of the safety net we like to believe is in place when we luft.

Care of altimetry

Standards needn't break the bank. The introduction of Mode C transponders will link our altimeters with the radar responder apparatus, and will ensure a safe level of calibration of all altimeters so fitted. Until all altimeters are Mode C however, the problem of accuracy will remain. I suggest that safety-conscious pilots check that a VFR altimeter is within 60 ft* of ramp elevation when set to QNH on a controlled airfield, and if the thing fails the test, minimise time above 5 000 ft (errors increase with altitude) until recalibration. Pray that the other pilot has a like philosophy.

**be advised altimeter standards are under review and may soon be changed*

In particular, I hope no-one flies above 10 000 ft with an altimeter that's out of whack. Who's good at sums? If it's 60 ft out on a coastal strip, how much will it be out at 19 000 ft? (that's really not a fair question, because the error is not all altimeter error — the tolerance of 60 ft is made up of altimeter, ramp survey, and QNH errors). A ramp check to technical accuracy of an IFR altimeter is not so easy because of those ramp elevation survey and QNH errors, so my suggestion is to do frequent checks for 60 ft of ramp elevation at controlled airfields, and have the altimeter calibrated every two years or so.

Under the hemispherical rule you will never be head on at the same altitude to another aircraft, well, not quite: you should be at least one degree off a reciprocal track, unless the other pilot is diverging to avoid cloud or something. As with the present system you will have a chance of converging on other traffic at the same level, so, as with now, you'll have to keep the information flow going and the eyes out.

Proximity — a random sample:

A month or two ago I was en-route Adelaide-Canberra in a PA32. At the start of a 65 nm west to east leg south of Mildura I heard a Sunstate Shorts 360 out of Swan Hill calling for traffic for descent into Mildura. We mutually decided that I would hold my 8 000 while the Shorts would maintain 9 000 until he was well clear of my track. We must have been 80 nm apart when we made that arrangement. There wasn't another aircraft within VHF coo-ee, and it seemed a mighty lonely piece of sky out there — yet, if we'd been at the same level we'd have gone within a hair's breadth of colliding. I reckon we passed close enough to read rego, but if it hadn't been for radio there's a good chance neither crew would have seen a thing. The problem is called empty-field myopia, and up there it has our eyes focusing at about two metres unless we're actively looking (*see Dr Rob Liddell's article on in-flight vision in ASD 142*).

Climbing and descending

It's not hard to see the climb and descent as a critical phase of flight. Because of traffic convergence in terminal areas you have the maximum chance of intercepting another aircraft's path over the geosphere (that's a fancy way of saying his track), but on the other hand you will probably spend least time at the other pilot's level. In any case, traffic information will enable IFR aircraft to keep apart, and see and avoid backed by awareness of proximity will minimise the chance of hitting another aircraft during this phase of flight. Hopefully, people will keep talking and tell others what they're doing, so that mutual separation will be arranged just as we have done under the present system.

While the rules on cruising levels can, if accuracy is maintained, keep things pretty safe in the cruise, all bets are off when one or both of a conflicting pair of aircraft are in vertical transit (read climbing or descending). When this is happening lookout is restricted by aircraft pitch angles, by focus on tracking problems, by skyglare for the pilot in climb, and by terminal area cockpit workload for one or both crews. The psychological pressure to lower the priority of lookout is almost overwhelming, yet it is at this time that the need is at its greatest.

The answer is to use the radio. If each pilot is aware that there is another aircraft in the vicinity then that psychological connection is severed, and lookout is restored to its appropriate high priority. Make an informative call when you're airborne — broadcast your direction of turn and nominate your proposed level and track. Assume there's someone out there who might need to know what you're doing, so don't wait until you're settled within five degrees of your outbound before you report departure. In a modern turboprop or jet you could be through 7 000 before you're on track (how many pilots level at 1 500 ft AGL and stay within 5 nm until they establish?).

Another way to stay out of hassles with aircraft climbing or descending is to avoid terminal areas unless there's an operational need to go there. In other words, don't simply overfly a busy airfield if there's a viable alternative route. I know, all the ERC tracks go via nav-aids, the nav-aids are at the busier airfields and there are a lot of good reasons for that. Notwithstanding, you can use some judgement in risk minimisation — if you overfly at lower altitudes you stand more chance of conflicting with terminal traffic in climb or descent, and there will be more need for co-ordination, more RT and so on. In the ICAO sky you may often choose to avoid the busy spots by selecting an offset nav fix or a visual fix because there won't be the same reporting requirements and you won't have to figure out a way of describing an offset fix as a reporting point to Flight Service.

Conclusion

The only conclusion to come to is that you should get to know the new rules before they arrive — sooner or later you will have to come to grips with them, so what's the point of waiting, especially when the waiting will make life harder and more dicey? Get on to the radio and let other pilots know what you're doing — don't use it as a CB (there may be someone trying to get through) but frame your calls in the order **reason** for call; then **brevity** and last of all, **style**, rather than keeping quiet or hesitating because you can't remember the stylised format. Other obvious hints include:

- when you're cruising, hold your height and keep your eyes peeled;
- when you're climbing or descending in VMC, regardless of your category, make sure that comms and lookout have the highest priority;
- don't overfly a busy airfield at lower altitudes (particularly not low enough to pass through the flightpath of traffic doing actual or practice instrument approaches) unless there's an overriding operational reason for doing so;
- when down low, don't be foolhardy about flying close to cloud — rules may allow it, but the option is up to your sense of airmanship; and
- what was that altimeter check? It was ***within 60 ft — on a reliable ramp with a reliable QNH***.

Have a good flight in ICAO airspace □

AIRCRAFT ICING

Pilots are reminded that relative humidity or 'wet bulb' information to assist in calculating icing probabilities is routinely contained in aerodrome weather reports and is available pre-flight and in-flight upon request.

An instructive tale

by courtesy of 'New Zealand Flight Safety'

The following contribution, by Ross St George, needs no introduction other than a recommendation that all instructors and all VFR pilots read it.

THIS NOTE is about bad weather decision-making and the messages carried by instructor reactions. I recently flew from Palmerston North to Wellington on a day business trip. It was a VFR flight in a Warrior with one passenger. A front associated with a depression was forecast to arrive in the Wellington region mid afternoon.

As it happened, the front was moving northwest somewhat faster than predicted, and low cloud and rain showers were encountered on the approach into Wellington via the Hutt Sector.

The aircraft was parked at the Wellington Aero Club and a taxi taken to the city. The taxi driver indicated that he was completing an instructor's rating and went on to express his disquiet about the need, time, and cost at having to probably attend an Instructional Techniques course, as notified in a recent CAIC-GEN. His passengers both had an interest in education, one particularly in pilot education, so the subject was probed a little further without giving too much away. Our friend, chasing a 'C' Cat, reckoned it was all pretty obvious — instructing, that is. It was what teachers had always been doing to him and now what flying schools were currently putting him through. He could do it to others until the hours were clocked up and a right-hand seat came up, or charters, or anything more lucrative. Of course it is not an uncommon attitude and perfectly realistic in building and aviation career, but it doesn't make the job of getting and keeping good instructors easy. Thoughts about instructor attitudes and attributes were largely put aside until the events of the afternoon.

A mid-afternoon departure for Palmerston North was planned for. It was clear that the cloud base was down, the Hutt and Ohau routes north were certainly out for VFR traffic, and there were rain showers about. Met office reports for Paraparaumu and Palmerston North were acceptable — if you enjoyed scud running up the coast at 1 000 feet amsl. The question was whether or not a departure via the Sinclair Sector was possible. In the absence of recent reports, it was look-and-see or leave-it-alone time. With the cloud base at 800 to 1 000 feet, the decision was made to file for a departure via the Heads and then over to the Sinclair Sector. Taking off to the north, the Hutt Valley was barely visible and the cloud base dropped to 600 feet on occasions with drizzle. At the Wellington Harbour entrance, prospects from Island Bay and on to Sinclair Head looked no better. Not my kind of weather, not for VFR flying, nor that in which other lives and property should be risked. The flight plan was cancelled and we proceeded back to Wellington to put the aircraft on tiedowns.

The trip to Palmerston North was by rental car, with the decision reinforced by the sight of Mana Island nearly obscured and Kapiti Island not even visible. To think that we would have been ahead of this would simply have been dangerous thinking.

Two flight training organisations needed to be informed as to the whereabouts of the aircraft. Here, instructor reactions tell their own story about pilot decision-making and the sorts of attitudes that instructors can convey. At organisation 'A' the reaction was 'When and how will you get the aircraft back? There is a booking tomorrow.' At organisation'B' the reaction was 'That was the right decision. You are safe, the aircraft is intact.'

The contrast is instructive. One instructor did not reinforce appropriate pilot judgment, the other did. *Get-home-itis* arises from within, but it is caught and taught in subtle ways. And, say we had made it, through weather VFR minima or worse, would I have been a better or safer pilot for the experience? Probably not. Just more likely to fly myself and others into worse conditions beyond my knowledge, skill and control.

I hope the budding instructor driving a cab in Wellington reads this. A good course won't just be about chalk and talk. It will be about the subtle signals of safely conveyed in everyday language and behaviour in and around aircraft.

In more ways than one, the wrong attitude will lead to a loss of altitude. That can be far more painful than thinking you have lost face.

(Ross St George is a senior lecturer in the Department of Psychology at Massey University in New Zealand) □

Maker-meeting

or, why should it happen to you, before your time?

FLYING IS FUN; aircraft crash; people die. Driving is fun; cars crash; (many) people die. Nowadays, TV reports of twisted metal at roundabouts hardly raise an eyebrow over the breakfast weeties and, alas, it's getting that way about light aircraft accidents, too. *'They choose to fly as a hobby, they crash, they die — that's their problem'* seems to be becoming a conditioned response. Well, this magazine believes that pilot education is the mechanism to mitigate (for it never will be cured) the incidence of unnecessary grief in the air.

We have said, on more than one occasion, that flying an aircraft properly requires total attention and dedication — there is no room for showing-off, bending rules or plain stupidity. It is quite legitimate to experience exhilaration as one of the pleasures flying offers. It should not be sought, however, in an atmosphere of irresponsibility, selfishness or bravado, for the result will not be that described by the beautiful old French phrase, *joie de vivre*, but rather the more appropriate Oz expression — *wanking* (cf Macquarie Dictionary of Australian Colloquialisms). Goodness knows, there's enough of this on our roads, don't let it permeate our airspace.

These few but sincere thoughts are generated by this letter we received in response to our newspaper report (*ASD 148*) of the flour-bombing accident — see also *Low flying* in *ASD 149* — and our remark to the effect that flying should be taken seriously and conducted with sober attention.

Read the letter, weep, and hope you don't meet the writer at anything more than walking pace □

POLITICIANS THINK THEY
CAN WALK ON WATER
(TALK IS CHEAP)
THIS PILOT CLEARLY HAS
THE SKILL!!
BUT IT APPEARS THAT
TALK (HOT AIR) IS ALL THAT
AUSTRALIA CAN FLY ON
TODAY PITY!!
YOU DONT GET THAT SORT
OF SKILL SITTING BEHIND
A DESK LOOKING DOWN YOUR NOSE
AT OTHERS TRIVIAL PERSUIT?
THIS PILOT IS GOOD AT HIS
CRAFT (FLYING) CAN YOU
SAY THE SAME FOR THE
PERSON WHO SAID TRIVIAL
PERSUIT WHEN OTHERS WOULD
SAY SKILFUL

P.S.
Sometimes flying
is meant to be
just plain FUN!!

(name and address supplied)

AIRFLOW

Dear Sir,

It is apparent from the number of articles on the subject appearing in *Safety Digest* and other publications that carburettor ice is still a serious problem, at least to some pilots. The usual thrust of such articles is to provide the reader with detailed technical data showing the most likely circumstances conducive to the formation of carburettor ice. As the owner/pilot of an aircraft prone to this type of icing (Piper Cub), I follow a very simple procedure to avoid it, and would be surprised if many other pilots, accustomed to managing carburettor ice, didn't do the same.

There are two simple rules to be followed, and they quickly become part of the normal operation of the aircraft:

Rule 1. Whenever the throttle is closed in flight, apply carburettor heat.

Rule 2. Whenever the revs drop unexpectedly in flight, apply carburettor heat.

Of course, the above should be considered merely as first actions. For example, in Rule 1, we should add that the throttle should be opened from time to time, to clear the motor and maintain engine heat.

Rule 2, should include the need to watch the tachometer for the increase in RPM that indicates the dissipation of carburettor ice, or for other indications requiring other actions.

Application of these rules does not demand a knowledge of climatic conditions conducive to carburettor ice and no harm is done by applying them even in the absence of icing, ie most of the time.

Needless to say, should any procedure to deal with carburettor ice specified in the aircraft handbook be followed conscientiously.

One last thing: if your motor quits unexpectedly when you are rolling out after a landing, you have probably just had a narrow escape from the baneful clutches of carburettor ice.

Dick Cahill

Whereas ASD agrees that simple, all-encompassing rules may be effective, there is absolutely no reason why they should be applied by rote. Pilots are, or should be, interested in the technical quirks of their machines. Our article attempted to present the reasons for carby icing in a readable fashion.

Dear Sir,

Re Flight into NON VMC: Is there a clear horizon?

Your latest article on the dangers of flight into Non VMC is a timely reminder to alert pilots to the dangers of flight into non VMC. I feel it misses one important point — the concept of maintaining a clear horizon to assist in avoiding flight into non VMC conditions.

Your article follows the traditional line of 'you'll be legal (therefore safe) if you maintain x ft from cloud vertically and y metres horizontally while maintaining z kilometres visibility'. I believe there is a general difficulty in determining accurate in-flight distances to cloud and visibility amongst many pilots. This in turn makes the concept of maintaining VMC more difficult to apply and possibly less meaningful in the minds of those pilots. Whatever the case, I believe the one concept which can alert pilots to the possibility of imminent danger is the absence of a clear horizon. Let me elaborate:

- Many (I would maintain most) pilots cannot tell you from memory the required distances from cloud/ground and visibility to maintain VMC;
- The required parameters for flight in VMC may be almost impossible to judge accurately in flight, particularly for pilots of limited experience (ie the many demands on the pilot, particularly in deteriorating conditions, may interfere with the accuracy of the judgement of distance from cloud or in-flight visibility). One pilot may estimate in 10 km visibility, another 8 and yet another 6. This may induce some pilots to believe (of course wrongly) that the legal parameters for VFR flight are somewhat elastic in practice; in this situation, there is no clear cut point at which a flight must be diverted, no definite point at which alarm bells ring;
- In-flight visibility/distance from cloud can vary considerably over a small area. Often a small change in track can successfully appear to maintain legal VFR, only to have it disappear a few miles further, sometimes with the weather apparently closed in behind. What has probably happened is that the weather has not closed in behind at the last minute, but that the meandering track through marginal weather required to maintain VFR has given the appearance that the weather has suddenly closed in behind; and

AIRFLOW

- Over reliance on the difficult-to-apply concept of VMC can cause the pilot to overlook other danger signals — they are likely to ignore the fact that the big picture is telling them that the flight is heading toward disaster and should not proceed. I believe the fact that a flight may be currently legal (or on the borderline, given the difficulty in determining accurate VMC criteria) **can lead to the false assumption that the flight is proceeding safely**.

What I am trying to say is that pilots must be aware of the big picture. Are they heading towards generally bad/deteriorating weather at the rate of 2 or 3 miles per minute, or is the weather improving? What does the forecast say? What do pilot reports indicate? Are they heading towards an area of rising ground? Is there a way around the weather? Most importantly, the simple test: **IS THERE A CLEAR HORIZON?** This vital question should be placarded on the panel of every VFR aircraft in the country!

I am indebted to Ken Cobden, an experienced charter pilot whom I met briefly many years ago at Hay NSW. Ken took me aside after I landed at Hay at the conclusion of a yet another 'marginal VFR' flight into deteriorating weather. While fuelling our aircraft, he explained his personal standard for VFR flight. 'Whatever you do, maintain a clear horizon! If you can't see a clearly defined horizon then reduce your altitude or divert to where you can see a definite horizon.' These are life saving words! Once at 500 AGL, if it is necessary to fly lower to achieve a clear horizon then an immediate clear cut decision point has been reached! NO — I will not go lower and I will divert NOW to a direction which has a clear horizon (even if it is behind!)

I still read the forecast and endeavour to maintain VFR by the book. But I now have a simple rule which is easy to understand, alerts me to danger much more consistently and much earlier than before and assists in deciding a safe course of action.

I remember a flight from BK to Maitland some years ago to attend an airshow there. North of Hornsby, we encountered marginal weather, with rain, and reduced visibility. I applied the rule, There's no horizon, don't even try was the answer. I looked east — there was a clear horizon with adequate clearance from cloud so I headed out to Palm Beach. At Palm Beach I looked north, again there was a clear horizon, so keeping one eye on a possible retreat (making sure the horizon kept clear to the south) we proceeded to Maitland. At one point we had to descend to 500 ft over the water, but there was a clear horizon with good visibility. Shortly after, the weather cleared considerably and we tracked to Maitland.

That's not the end of the story. On landing at Maitland I met two acquaintances from BK who had also flown to the air show. They had both tracked directly through the area of bad weather north of Sydney and openly boasted that they had flown through heavy cloud, which at times was down to ground level! Their misplaced sense of bravado disappeared when I informed them a small diversion would have saved them the unnecessary risk.

There is another area where we can help our fellow pilots. We often have good knowledge of potential weather problems in our local area and how to avoid them — we have an obligation to take pilots unfamiliar with the area aside and give them the benefit of our knowledge.

I have since had many encounters with bad weather and don't hesitate to divert if I can't maintain a clear horizon. In many cases an extra hours flight is all it takes to divert around the weather. Occasionally it means an unscheduled stay overnight or a cancelled trip but my passengers only come with me on the understanding that they might have to pay their train trip home.

Peter J. Wordsworth

Dear Sir,

It was with interest that I read Mr Reinke's letter (*ASD 148*), and with even more interest that I noted the Examiner of Airmen's comments.

Has training changed significantly in the last twenty years?

I, presumably like Mr Reinke, was taught to do a trouble check when rough running was encountered in flight. Yes, a magneto check was included — fortunately!

At about 500 ft, I experienced severe rough running, which rapidly became worse. I did my trouble check and discovered comparatively smooth running on the left magneto. As things now seemed fairly stable, I continued the flight to the closest airfield, about 20 miles away. After a tight circuit, I completed a normal landing.

Upon examination of the magnetos, it was found that the brass contact on the rotor-button had come loose and had shaved off the brass spark-plug lead contacts on the inside of the distributor cap. These brass filings then aligned themselves in such a way that the electric current either found its way to the wrong spark-plug, or did not get there at all.

Now, as the aircraft I fly has a duplex magneto system, some of these brass filings were able to make their way into the adjacent distributor cap, causing rough running on the left magneto.

I believe there are two lessons here:

- avoid duplex magnetos; and
- magneto checks in the air do have a place.

J Crossley

Dear Sir,

Gordon Reinke's problem with his Mooney could have a number of causes, and no doubt has been rectified by now. The comments of the Examiner of Airmen all make good sense.

However, I feel that it is worth mentioning that the symptoms experienced by Mr Reinke parallel exactly those of a number of aircraft fitted with Bendix magnetos with defective coils (at least one aircraft was written off). Therefore, if the Mooney 20B in question has one of several types of Bendix magnetos fitted, it would be wise to ensure that AD/ELECT/53 as amended has been carried out.

M G Elbourne

Airworthiness Branch thanks Mr Elbourne for the input, confirms his details, adds that the problem has been known for some 18 years and notes that Bendix SB 560A (Sept 1973) also refers.

Dear Sir,

Re the magneto problem in the Mooney (*ASD 148*), I too have had a similar experience on a trip returning from the Birdsville Races in 1989. The aircraft concerned was a M20J.

The route was Birdsville — Bourke — Bankstown, and the mags checked out fine at Birdsville in the rush to be off the ground. On pulling up to the bowser at Bourke, I did what to me is a pre-shutdown check at idle RPM. I received a surprise in the form of a dead cut on the right mag. Safety prevailed and I called for a 'Rescue 8' from the person who had hired me the aircraft.

Subsequent checking of the magneto revealed that the wire to the condenser had broken at the spade connection, thus no spark. The aircraft had performed faultlessly during the flight, thanks to the dual ignition system.

This fault is something that is difficult to notice during a 100-hour check, especially when the tight confines of the Mooney's engine bay are taken into account, but it represents a prime example of Murphy's Law.

Peter Eaton

Dear Sir,

A lot has been said about AMATS, pro and con. While it all seems good in theory, I am a little concerned about what happens now at busy remote airstrips, not to mention what could happen in the future. Presently there are 'cowboy' pilots who do not use radio, join the circuit in incorrect ways and are generally dangerous. More than once, I have taken off or joined the circuit, only to find an aircraft conducting abnormal circuit procedures and who had failed to make either an inbound or a taxi call. These pilots are commercial pilots as well, whom you would think would know better.

Yes, airmanship will play a large part in keeping 'G' airspace safe, but what do we do with the cowboys in the system, who make life short for us all?

Philip J Dodd

*see also Commodore Partington's article elsewhwere in this edition.

AIRFLOW

Dear Sir,

On 27/12/90, I flew a Cessna 172 from Yarrawonga to Corowa to refuel the aircraft. Loaded, with three passengers, we departed Yarrawonga in moderate conditions, but once airborne, minor turbulence was encountered; this persisted throughout the flight.

As I approached Corowa, where a parachuting competition was being conducted, I made an all-stations call and made contact with the pilot of a Nomad on climb to 10 000 ft for para dropping. The pilot was experiencing strong winds which he considered too dangerous for the parachutists, so he prepared to RTB. This indicated to me that conditions were not good in the Corowa area.

I joined and landed on runway 05, experiencing a minor crosswind from the NW, not previously apparent as I flew over the windsock.

I taxied to the refuelling pump and pointed the aircraft SE. My pax and I alighted and found merely a gentle breeze, with minor gusts of warm wind.

I located the refueller and was walking back to the aircraft with him when he pointed out some dust blowing in from the NE. Neither of us was too concerned. However, as we were preparing to run out the fuel hose, the refueller alerted me that the aircraft was moving. I rushed to try to hold it as it turned to the left towards the fuel pump. The brakes were on, the wheels were skipping across the bitumen and I had difficulty preventing it from hitting the fuel pump. My predicament was noticed by some of the parachutists; about ten of them came to my assistance and halted the aircraft.

At the same time another Cessna was taxiing into wind, some 20 metres from us. We saw a wind gust lift the aircraft's right wing, the nose dipped and the propeller struck the bitumen.

The Cessna turned to the left, away from us, thus exposing the raised wing to the full wind. The aircraft was flipped on to its back and sustained serious damage. The pilot received head injuries.

A Nomad, standing untethered on the grassed area had its right wing lifted sufficient to cause the left wing-tip to strike the ground. The gust dropped suddenly and the aircraft fell back heavily on to its landing gear. Then the parachutists roped it down to drums of jet fuel rolled to the underside of its wings.

After the wind had calmed down, I noticed that a hangar had been damaged, and a recently-erected shed flattened.

Without the help of the parachutists there would certainly have been major damage done to the Cessna and the refuelling pump station. I am very grateful for their assistance.

After this experience, I would like to warn pilots of high-winged aircraft to be on the alert for this sort of thing. It was an eye-opener for me to see the ease with which a sudden gust of wind, lasting about 30 seconds, affected aircraft on the ground.

WJ Clayton

Summer in Australia means sudden squalls, gusts, willy-willies, call them what you will, on heated aerodrome surfaces. Be aware of conditions that may precipitate these mischievous devils; a safe aircraft is a properly secured aircraft. See also 'Christmas comes but once a year...' in ASD 146 □

Errata ASD 148

1 Cairns ATS were quick to pick the typo in the article ***What to do if you're lost.*** Under the paragraph ***Help*** on page 21, the reference to planned radar coverage diagram should of course have read ***1993***, for that's when the RASP (Radar update) program is planned to be completed.

2 Ken Burrows, CPL, Melbourne, point out that there is an inconsistency in the antepenultimate paragraph of ***A remote chance.*** The relevant sentences should more properly have read:

Instructions for the correct use of an ELB are contained in the back of the Enroute Supplement (ERSA). Have an understanding of these procedures before you climb into the aircraft, for they may be difficult to read while you're floating around.

Unlicensed? It could be a financial disaster

Kerry Lovegrove, Flying Operations Inspector

I HAVE BEEN involved in the aviation industry for 27 years and commenced my commercial activities in the Gascoyne region of WA as an aerial mustering pilot. In this capacity I learnt how to muster sheep, cattle, goats & fish. Each activity required varying techniques, and these were conveyed to me by very experienced people including several senior instructors at Jandakot, an old and wise crop sprayer from the wheat belt area and an extremely experienced pastoralist from the Gascoyne who had been mustering stock for many years. With all this knowledge, I survived with merely a few life-threatening experiences.

Stock mustering with an aircraft is a precise operation and there can never be too much information and experience. Therefore, I consider it extremely foolhardy when in my role as CAA Flying Operations Inspector I occasionally come across an incident or accident associated with pastoral flying involving a pilot who does not hold the required licence or rating and who has obviously not taken advantage of all the instruction available to him. The granting of a restricted private pilot licence is not a licence to conduct the potentially hazardous task of aerial mustering. Instructions in navigation, meteorology, fuel management and low flying are not included in the restricted licence syllabus and are considered absolutely necessary for pastoral flying activities. The most important ingredient, however, is the knowledge gained when obtaining an *Aerial Mustering Approval.*

In 1989 the CAA, in an attempt to harness the mustering expertise, granted training approvals to several pilots with extensive knowledge in these operations. This concession greatly reduced the cost of obtaining a mustering approval and we believed it would eradicate any reason to operate illegally.

The effort involved in setting up the approval program was quite extensive and it is with extreme disappointment that we find it necessary to once again remind the pastoral industry of its responsibility regarding air safety.

I would like to take this opportunity to advise a few irresponsible pilots of the ramifications of flying without the necessary qualifications and the situation they put themselves in because of blissful ignorance or blatant disregard of the regulations. I am sure that no sane person would knowingly put themselves or their family at risk of financial ruin and I am therefore hopeful that the following example will help common sense prevail.

Let us now intrude into the life of Tex Noitall. Tex was the owner/manager of a moderately successful sheep station in the Pilbara region of WA. The management of the station had recently been handed to Tex by his father, who together with Tex's mother, lived on the station and were reliant on the income for their retirement.

The station had used aerial mustering for many years, so Tex decided to invest in a PPL to reduce the cost of contracting. In due course, and in proud possession of a restricted licence, he then leased a new C172.

Tex revelled in his new-found skill, and as he was very experienced in handling stock, decided there was nothing left to learn about aerial mustering. Unfortunately for everyone concerned, our pilot overestimated his ability and underestimated the degree of skill needed to carry out a mustering operation successfully and safely. He ran out of fuel at low level, stalled the aircraft and impacted heavily with the ground (ie crashed). The aircraft was damaged beyond repair and although Tex miraculously escaped major injury, his passenger Johnny Smith was badly knocked about.

The investigation indicated that Tex had been negligent in his fuel management, and when it was ascertained that he did not possess the required qualifications to carry out aerial mustering, the Insurance Company waived any responsibility, leaving Tex with an expensive bill.

The injuries sustained by Johnny Smith rendered him incapable of ever working again, so Johnny's family sued Tex for damages. The court concluded after hearing all the evidence from the witnesses that the pilot was indeed negligent, and because he was inappropriately trained was responsible for all costs and damages.

The insurance company once again, after studying all the evidence, disclaimed any responsibility. The liquidators have now offered the station for sale and Tex and his family are bankrupt.

This scenario, although extreme, is quite possible. It is designed to demonstrate the foolishness of conducting unlawful mustering operations.

The person on the land is copping it tough enough: family responsibilities demand the benefit of all the protection that is available. It is too late in hindsight for a pilot to reflect upon what should have been done to maximise this protection.

If you cannot afford the additional cost involved in obtaining the required licence or endorsement, perhaps you should think carefully before even committing yourself to the initial Private Pilots Licence □

Pilots' sunglasses: mystique or mandate?

by Frank E Dully Jr, M.D.

Field Associate Professor of Aviation Safety
University of Southern California

Editor's note: this article is highly recommended to all pilots, particularly as an efficient visual scan, always important, becomes under the new rules an even more vital part of defensive flight, VFR or IFR.

SUNGLASSES are as much a part of flying as the legendary white scarf and leather jacket. The stature imparted by the classic shape of aviation glasses with subtle gold frames is widely imitated outside the aviation world. The sunglasses choices available are mindboggling. Plastic or glass. Gray, green, brown, yellow or the newest addition to the family, rose. Heavily or lightly tinted. Coated or uncoated. Mirrored or plain. Polarised or unpolarized. Blue-blockers or regulars. Self-darkening or fixed colour. With or without anti-reflective coatings.

In the movie 'Top Gun', sunglasses were the hallmark for the fighter pilot who was a winner (they were even worn in the bar!). Not surprisingly, an unsubtle competition is evolving in the market place to develop the 'coolest' form of sunglasses, without regard for the adverse effects of diminished light presentation to the retina. The price being paid to look cool may be impaired visual acuity. Visual acuity is irrevocably tied to available light, and the indiscriminate use of sunglasses to 'protect' from high ambient light conditions impairs pilot performance by compromising the retina's ability to present a decipherable cerebral image.

There are several excellent reasons to wear sunglasses. It is generally accepted that glare is harmful to the eye and that protection from glare is therefore therapeutic, even though studies show that only 22% of the population reacts adversely to glare. Eye fatigue is offered as a reason to wear sunglasses, but the biggest contributor to eye fatigue is not light, but refractive error, primarily uncorrected astigmatism. Exposure to heightened levels of potentially harmful ultraviolet light reflected from the aviator's favourite milieu, blue sky and clouds, is also listed as a reason to wear sunglasses. The most convincing reason, however, is the adverse effect on night adaptation when unaltered high ambient light levels are endured during the day.

The older eye compares unfavourably with the younger one. Since visual performance is directly related to image luminance, it follows that the older eye, being less responsive to changes in light levels, is at a disadvantage. There are several reasons for this. First, there is less increase in pupilary size with decreased luminance. Second, changes in the lens and vitreous humour make the older eye more sensitive to glare. Third, there is an overall reduction in the transmission of light. This translates directly to a need for more light to be able to see, and to age-related problems with visual acuity in diminished light. Behind their sunglasses, younger pilots will have more pupil dilation than those who are older. Older pilots, therefore, should wear sunglasses that allow the passage of more light to the retina. It has been reported that to obtain the same contrast-detection performance as a twenty-year-old, a forty-year-old needs 40% more light, and a sixty-year-old 100% more.

Visual performance is not a constant, even across a population segment that passes the same visual acuity tests. The individual diversity present within a specific age group shows sufficient statistical variability to suggest that no one pair of sunglasses will answer the needs of all members of that age group at the same time, and that these needs change according to ambient light conditions.

A high-level light source, such as glare, causes pupilary constriction. The smaller the aperture through which the eye must see, the darker is the image created on the retina. Nearly 25% of the population is extremely sensitive to glare. Their pupils are nearly pinpoints under such exposure. Diminished retinal luminance causes measurable visual decrements. Sunglasses will improve this visual acuity problem by counteracting the amount of available light.

Conversely, another 11% are at the opposite end of the sensitivity spectrum. These people actually have improved acuity under high glare conditions, and seem to have no need for sunglasses. The remainder of the population does not care one way or the other. Glare for them is a non-event in terms of altered visual acuity.

Eye fatigue can be a genuine issue if glare sensitivity includes eyelid spasm, tears, photophobia and squinting. The astigmatic eye, because of its commonality in the population and the amount of effort required to 'neutralise' its flawed imagery (however incompletely), is statistically a more important culprit. Both victims will appropriately complain of eye fatigue. Prescription lenses will be required to correct the delicate sensitivity problem. Where these problems coexist, prescription sunglasses answer the need.

Sudden light changes

Glare also has the capability to produce other transient problems with visual acuity. A sudden change in image luminance, such as experienced when driving into a dark tunnel, or when exiting a movie theatre into bright sunlight or as experienced when first putting on sunglasses, will produce a brief interval of reduced vision requiring increased caution.

Older pilots should wear sunglasses that allow the passage of more light to the retina.

Ultraviolet light (UV) with a wavelength of less than 315 nanometres is a known cause of premature cataract formation. Cataracts cloud an otherwise clear ocular lens, presenting a physical obstruction to the passage of light through to the eye to the retina. Impaired light passage equates to impaired image formation without regard to where the impairment originates. UV light with a wavelength between 300 and 400 nanometres interferes with vision by causing fluorescence of the cornea and lens, recognised as a bluish haze especially when the light source is obliquely directed. Thus, a low-lying sun need not be in the direct line of vision to compromise performance.

UV light sources include both the sun's direct galactic radiation and a clear blue sky, where these rays have been scattered as they pass through the earth's atmosphere. At the earth's surface, 6% of the sun's radiation is UV light. This percentage increases by four percent for each additional 1 000 ft of altitude, clearly presenting special hazards to aviators. There are three recognised subsets of UV light: A, B and C. UV-A passes through many types of glass and is the cause of sun-related drug reactions. UV-B is the sunburn-inducing, cataract-causing carcinogenic segment. Ordinary glass will block UV-B passage. UV-B will penetrate to a depth of three feet in water, and will pass through a thin cloud layer to produce sunburn on an overcast day.

It is not necessary to wear lenses inside the aircraft to protect a pilot from the injurious part of the UV spectrum, because canopy or cockpit windows made of polycarbonate will also block UV-B. Acrylics, however, will not block UV effects. (open cockpit and ultralight fliers have a problem readily solved by wearing either glass or polycarbonate sunglasses). UV-C is absorbed by atmospheric ozone and is not supposed to reach the earth.

Bright day — dim night

A day at the beach or on snowy, bright ski slopes without attenuation provided by sunglasses will provoke a memorable evening drive home because vision will be severely flawed at night. This deleterious effect commonly lasts for hours, even though under normal conditions full night adaptation is achieved in about a half hour. This failure to wear sunglasses on any day having high ambient light bleaches the retinal pigments to a point that their restoration for night use the same day is significantly delayed.

The amount of light blocked by sunglasses is the key to how much decrement takes place in visual acuity while the glasses are actually in place. This decrement does not persist after the glasses have been removed. Generally, the darker the lenses, the larger the loss. This is the reason why baseball players delay flipping down their sunglasses from beneath their cap visors until they have located the arcing ball. *[cricketers, presumably, squint]*

The 'strength' of sunglasses is measured by how much light is allowed to pass through the lens. A product that blocks 85% of available light (this is the US military specification standard for aviators' sunglasses and tinted visors, and may have had its scientific origins in a 'best guess' scenario more than 50 years ago) allows 15% pass through for retinal image formation. If ambient light levels are extreme, such as from an overhead sun in a partly cloudy sky with reflections from water or snow below, such sunglasses should be adequate for the needs of the average pilot. The same circumstances later in the day for the same person may block too much light because the angle of the sun allows for shadows that attenuate light exposure, unless one looks directly at the source, or if presented tangential to the eye.

The sunglasses needed for mid-morning or late afternoon may not be the ones best suited at high noon..

Thus, sunglasses needed for mid-morning or late afternoon may not be the ones best suited at high noon. A lens that darkens or lightens according to the intensity of ambient light, or truly photosensitive lens, would appear to be the most desirable, especially since the pilot needs metered light abatement that is based on the severity of the exposure. However, lenses requiring UV-B to make them darken will not darken when worn inside the airplane, since UV-B does not penetrate the canopy or windows. Thus, what appears to be the best answer to the changeable needs of the cockpit, photochromatic lenses, turns out to be no answer at all.

The range of light transmission blocked by a photochromatic lens varies from a low of 20% to a high of 85%, and outside the cockpit these lenses appear to be a wonderful solution to the glare problem. Department store sunglasses made of soft plastic do not inhibit UV passage. These products commonly block 75% of available light but none of the potentially harmful UV-B.

Lens colours alter what is seen in different ways:

Green or gray are said to give the least colour distortion, and are available singly or in combination.

Yellow has the capability of filtering reflected short-wave blue which is found in air contaminants such as fog, haze, smoke or smog; these airborne particular suspensions blur images by reflecting short-wave blue light in such a way that the image on the retina is diffused instead of sharp -a phenomenon called 'chromatic aberration'. In certain conditions, therefore, yellow 'blue-blockers' can improve visual acuity, but not because it protects from glare. Yellow glass that cuts out more than 30% of ambient light will so alter colours that the distinction between green and red lights could be a hazard on the airport. Many pilots dislike the world as seen through yellow lenses, but a daylight flight in poor visibility caused by smog, while wearing light yellow lenses, can be an 'eye-opening' experience. However, military pilots who fly low-level missions complain that depth perception is adversely altered while using yellow lenses.

Brown, if it is not too dark, will enhance contrast as well as doing a modicum of blue-blocking.

Rose also increases contrast and blue-blocking; it offers a niche in specialised applications for automobile use.

The height of cool

Mirror coated lenses represent the height of cool by the use of attention-getting metallic deposits on the surface to produce the desired mirror effect. Aside from being fragile, such coatings substantially decrease the amount of light transmission with resultant loss of visual acuity if applied to an already-dark lens.

Anti-reflective coatings on the inside surface of lenses are designed to prevent the user from seeing an image of his own eye reflected on the back side of the glass. Such images are a nuisance under certain lighting conditions and present an unwanted distraction to a busy pilot.

Looking through a polarised window while wearing polarised glasses can result in no retinal image.

Polaroid lenses should be left in your boat. Their chief attribute is that quality polaroid lenses will completely eliminate reflected glare coming from a flat surface that is at an angle of approximately 53%. A pilot wearing polarised lenses sees the world as constantly changing according to his angle of bank, or the tilt of his head, as the angle of the reflected glare is altered. Looking through a polarised window while wearing polarised glasses can result in no retinal image.

Infrared rays should only be a problem for sun-gazers at eclipse time. However, any Lockheed C-130 pilot can attest to the elevated temperatures on the flight deck that result from the greenhouse effect in a cockpit with a large window area. It is not known to be an eye hazard.

The bottom line

The amount of light that passes through a lens is the most critical factor in selecting sunglasses to effect a compromise between visual decrement, colour distortion and glare or high ambient light protection. Lenses are categorised as being between a one and a four according to percent of light transmission and its basic colour. Thus, you can have a Brown 3, Gray 4, Yellow 1, Green 2 or any combination of a colour and a number. A Number 1 lens cuts 20% of available light, barely enough to be noticed, and except for yellow, useful only in the world of fashion. A Number 2 lens blocks 70%. A number 3 lens blocks 85% and a number 4 lens blocks 95%. There is no place in aviation for a Number 4 lens of any colour because of the severe decrement in visual acuity (though such lenses are available). Airborne in the cockpit, a pilot with 20/20 vision wearing Number 4 glasses has a visual acuity between 20/40 and 20/60 *[ie, 'poor '- ed]*, even though he could be a comfortable 20/20 on the sun-bathed ski slopes using the same glasses.

A Number 3 lens has utility only in unusually high light situations such as flying into the sun, or flying VFR just on top in bright sun. Interestingly, it is Number 3 lenses that are found in common use without regard for whether acuity suffers. Visual acuity while wearing Number 3 lenses can be degraded to an average of 20/30.

The Number 2 lens should be the aviator's friend, and then only when judiciously worn. A 30% light transmission presents the world with the same amount of light as that found in a 70% eclipse of the sun. That is what these glasses do. Subdued light is the result. Visual acuity is reduced minimally. Wearing Brown 2 glasses, the 20/20 pilot remains almost 20/20. Looking for traffic, the pilot should remove them. As soon as meteorological conditions permit, they should be returned to the case or pocket. Wear Yellow 1 glasses in haze or in the soup, and then only if they improve vision.

The effect of even a small difference in acuity on visual performance is commonly underestimated. So say the investigators at the US Naval Aerospace Medical Research Laboratory in their December 1986 report on the use of sunglasses and visors by US Navy fighter pilots. Visor wearers were at a 1.8 nm disadvantage in sighting a target compared to those not so encumbered.

Sunglasses should not be worn merely because they are available. Ambient light translates directly into visual acuity. Losses in the former impact upon the latter.

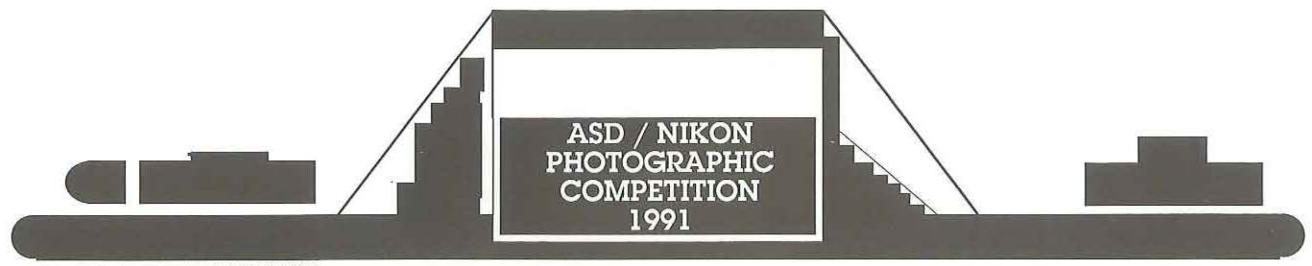
Aviators' sunglasses should

- be glass or polycarbonate;
- transmit not less than 25% of available light;
- not distort colours, distances or shapes;
- nullify the blurring of short-wave reflected blue; and
- increase contrast without misrepresentation.
- have any adverse effect on visual acuity well understood
- not be worn during conditions of diminished light.

There can be special times when an adjunct pair of Yellow 1 glasses (not sunglasses) can improve vision, but

Remember, being cool has a price.

Thanks to PANAM 'Flight Ops' □



The winners are:

Category 1 (a picture illustrating an aspect of aviation safety):
Lindsay Stepanow of Ballarat for the picture of the Piper on the back cover
Judges comments: *a powerful and dramatic image, illustrating one of the most dangerous conditions of flight. An eye - catching photo that conveys effectively its aviation safety message.*

Category 2 (colour picture concerning Australian civil aviation):
Brian Geach of Forestville, NSW, for our front cover picture
Judges comments: *a clean sharp professional photo with outstanding atmosphere. Visually stunning, with the helicopter caught in a spectacular setting.*

Category 3 (picture concerning Australian civil aviation, utilising B &W photography):
David Foote of Canberra, for his evocative picture shown on the back cover.
Judges comments: *good technique telling a simple, sympathetic story. Amusing yet saddening.Notable definition and contrast.*

Highly commended were:
Ian Ward of Horsham and **N Birks** of Keith,SA in Category 1, and in Category 2 **Paul A Gibbs** of Mosman, NSW, and **Lindsay Stepanow**.

We hope to feature their photographs in a future publication.

The judges remarked upon the high level of expertise shown, and added a footnote to the effect that photographic competitions with 'categories' were difficult animals to assess, as any restriction placed upon entrants can easily stifle creativity. It was pleasing to see that the winners, especially, had met the challenge.

Lindsay, Brian and David were presented with their cameras at a small ceremony at CAA Headquaters in Canberra, with Chief Executive Frank Baldwin officiating and John Swainston, Managing Director of Maxwell Optical Industries, delivering complimentary words of introduction.

Aviation Safety Digest would like to applaud Maxwells for their stout support for photographic competitions generally, and formally expresses our gratitude to their continued encouragement to civil aviation in particular.

Flight planning after 12/12/91

Karl Wally, Flying Operations Inspector, CAA

On 12/12/91 some very important changes will occur to facilitate the implementation of the new Australian Advanced Air Traffic System. One of them will be:

VFR general aviation flights will not be required to submit flight notification to the CAA other than for operations in controlled airspace above 10 000 ft or when SARTIME is to be held by the CAA.

'You bewdy, I won't have to fill in any of those dam' flight plans any more!'

True!

But wait a minute . . . how am I going to PLAN my next X-country navex? Where do I keep my flight log? And what about my fuel calculations?

Relax, all the good stuff your instructor taught you and all you ever learned about sound flight planning and preparation will still apply, merely the requirements for flight notification will have changed. To put this issue into perspective, let us examine what the all-familiar flight plan form actually represents.

There are three basic elements which make up this form. It contains:

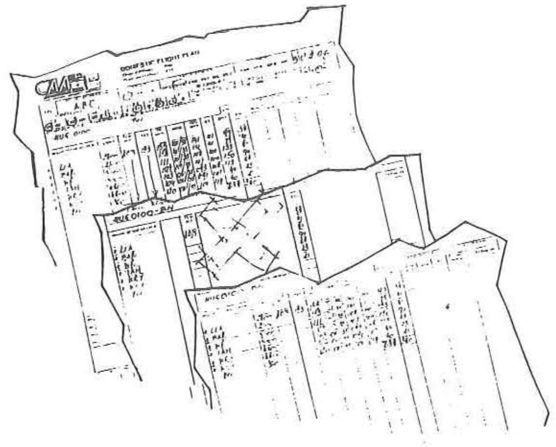
- all the necessary information for flight notification — aircraft callsign, departure point, ETD etc. i.e. the elements the FS and ATC are interested in;
- navigational information — selection of routes, distances, wind direction and strength etc., elements the pilot is interested in; and
- the Nav. log, the one your instructor reckoned looked like his two year old's first attempt at writing a letter of admiration to her father.

So you see, notwithstanding flight notification considerations, you still need to PLAN your flight properly. It is almost certain that the flight plan form as it now exists will be withdrawn, and replaced by a similar but simpler document.

To lodge a plan or not to lodge a plan? — *that* is the question.

At present, flight notification details are primarily used for two purposes.

1. To assist ATC in traffic co-ordination; that is, they want to know how many aircraft will want to use a particular piece of airspace at what time.
2. Certain bits of your flight plan details are used to provide a SAR service for you.



Flight Notifications

VFR GA flights will not be required to submit flight notification to the CAA other than for flights in controlled airspace above 10,000 feet

Traffic

Approach: it is very likely that you could expect a more prompt response from ATC for a clearance to enter, say, the Sydney Zone on a Friday afternoon when intending to land there after having lodged a plan in plenty of time than if you were to 'pop up'at the CTR boundary unannounced. But then again you might fare better trying to land at Adelaide having gone NOPLAN on a Sunday afternoon.

Departure: when flying away from busy terminal areas the VFR operator will think twice before lodging a plan, as Flight Service will no longer show any interest in them (they will no longer pass on traffic information about VFR category flights).

SAR

I believe this is an area where there is an inadequate level of understanding of what is actually provided for you. Specifically, I want to concentrate on the terminal areas, be they controlled or uncontrolled.

The first scenario, taking place at a major aerodrome, is as follows: a light twin engined aircraft fails to become airborne and crashes through the airport perimeter fence. Moments later a loud siren goes off. (*Those of us who have heard the sound of the 'crash alarm' at various airports will recall that anxious feeling, especially those instructors who have just signed out a student for solo practice*). Within a very short time at least one fire engine and ambulance arrive on the scene, rendering assistance to the occupants. Pretty good stuff.

Let us now assume that a similar accident takes place before 12/12/91, at a remote country aerodrome and that the pilot passed a taxi call to flight service thus activating a SAR watch. As no further communications are received and after a period of 10 minutes FS will initiate a communications check. After a further five minutes the FSO would declare the uncertainty phase, a call may be made to the local constabulary to see if someone can locate you on the airfield (or to see that the pilot hasn't given it away and gone back to the pub). By the time someone finally arrives on the scene it may well be too late. This is no way a denigration of Flight Service; they have certainly helped me over the years, but hard as they might try there are limits as to what can be done for you.

The smart operator will whenever possible detain someone at the airport to witness safe departure, usually the person who drove the pilot in. A discreet pre-take-off request or a brief comment on the availability of local medical help is usually all that is needed to have such matters uppermost in the person's mind.

So exactly what will change on 12 December?

As of that day VFR flights will no longer be required to submit flight details for flights other than those above 10 000 ft in CTA, or those nominating a SARTIME to the CAA.

Many VFR operators will therefore probably decide against submitting a plan, bearing in mind what we said about busy terminal areas. In addition they will think carefully about the most effective SAR service appropriate for the operation. There is little doubt that a person on the spot can be of greater help than someone miles away. That is not to suggest that those pilots who have no better means and are concerned for their safety should not avail themselves of a SARTIME service which will continue to be available through Flight Service.

There are also other changes coming into effect on 12/12/91, all of which will be explained in great detail elsewhere, which will affect the way we conduct a flight especially OCTA.

Example travel flight

VFR PVT Category flight from Toowomba Qld — Chinchilla — Bundaberg. The aircraft is a single engine 4 seater cruising at 120 kts. Our safety conscious pilot has planned this flight, as always, with diligence. This means taking everything into account, the major items being:

- weather/alternates;
- aircraft performance/characteristics;
- airspace, eg Oakey military CTR; and
- terrain.

The weather was 8/8 blue west of the Divide but not so good along the coast. Altitude selection was made taking into account:

- terrain, which is quite flat as far as Chinchilla, but somewhat higher towards the coast;
- weather, which was beaut; and
- aircraft performance.

As it turned out our pilot was the only one on board, suggesting good climb and cruise performance. So it was decided to cruise above 5 000 ft, and in accordance with the new hemispherical rules 6 500 ft was selected for the first leg. An accurate flightplan was compiled and neatly placed on a clip board where it could be easily accessed in flight. Our pilot decided against lodging flight details, as she would let someone at the aero club know when and where she was going. She also made arrangements for her mother to pick her up in Bundaberg at a prearranged time. As it was, she was to pick up a small package in Chinchilla which would be taken to the airfield by her brother. Besides, if the situation turned a bit nasty she could always make arrangements for a SARTIME en-route with Flight service.

Remembering that Toowoomba is only some three nautical miles from the Oakey CTR a call was made to Oakey Approach on VHF prior to taxiing, requesting a clearance to 6 500 ft. This was duly received, with a requirement to call Approach two miles west of Toowoomba. As Toowoomba was now a CTAF, a taxi call was made on the new CTAF frequency nominating Runway 29 for take-off. After talking to some other traffic in the circuit area to arrange for separation, departure was achieved. The aircraft reached altitude shortly thereafter and a report was requested overhead Jondyran (8 nm to the west of Oakey). At Jondyran advice was passed to monitor BN on area VHF. Flight service was heard passing traffic information to several IFR aircraft whose position relative to our flight indicated that there would be no conflict. Approaching 10 nm from Chinchilla and on descent, a change was made to the local CTAF and after making an all stations call the aircraft landed uneventfully.

Having instructed her brother to remain at the airfield until he could see her aircraft climb to height and depart towards the north-east our pilot taxied for departure. Once more the appropriate call was made on the CTAF to advise.

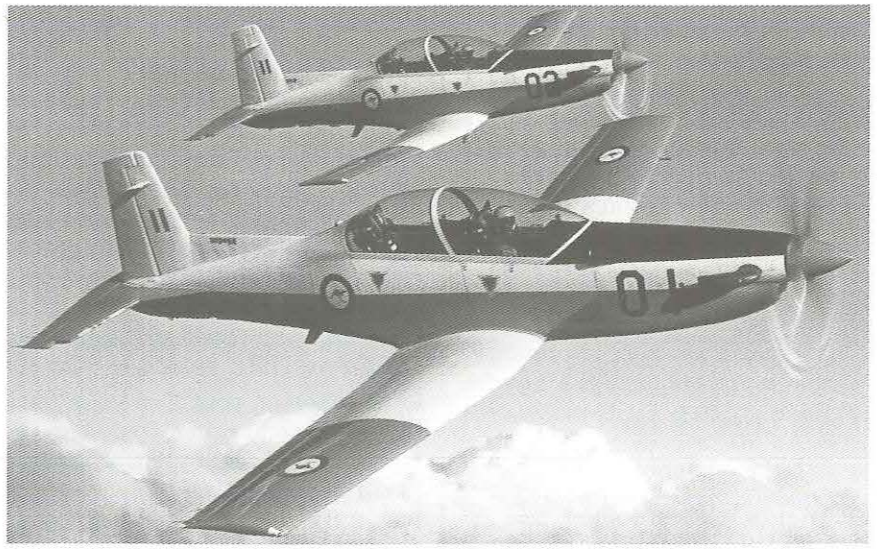
As it was, the aircraft performed as advertised and the flight planned altitude of 7 500 ft was easily reached. A groundspeed check abeam Boondooma reservoir revealed that progress was just a bit slower than planned but within the self-imposed tolerance of plus or minus 2 minutes. Shortly after, our flight passed over Gayndah and the pilot noticed the weather towards the coast wasn't looking too good. As the terrain fell away it was decided that a descent was necessary in order to remain in VMC.

Approaching a position approximately 35 miles from Bundaberg a call to Flight Service was overheard from an IFR aircraft that had departed Bundaberg some minutes earlier, advising that weather conditions there were deteriorating rapidly. It was at this point that the decision was made to call it quits and retreat. Our pilot then decided that the safest course of action was to land back at Gayndah and wait for an improvement in the situation.

But wait . . . *what about mother, waiting at Bundy airport? She would worry for sure!* No-one would know about the diversion to Gayndah! It was then that our pilot decided to call Flight Service and request a SARTIME be kept for the remainder of her flight. After asking for some details, such as aircraft type, callsign, endurance and POB, Flight Service advised that they would be happy to maintain a SAR watch, which was to be cancelled by phone on arrival Gayndah. With some relief the aircraft was turned on to the new heading, and an uneventful descent and landing was eventually completed. After cancelling SAR by phone and a quick call to Bundy, to let mother know that all was well, it was time for a tea-break.

The safety message in this story, in case you missed it, is that there will be times when requesting a formal SAR watch from the CAA is very much the smart thing to do.

I wish you all safe flying □



Military operations

IN NOVEMBER 1989, Central Office AIC C10/89 was issued to introduce procedures for military aviation activities particularly in relation to operations by RAAF PC9 aircraft.

A recent incident has highlighted the exceptional decent profile capabilities of this aircraft type.

The PC9 is capable of, and frequently operates with a descent rate in the order of 5 000 ft — 6 000 ft per minute which can be extended, if required, to 10 000 ft per minute.

The PC9 is one of many aircraft used in a military training role. Some of the other aircraft types, such as the F111 and the F/A 18 are also highly manoeuvrable as befits their strike role, and can climb and descend at extremely high rates.

Information about military flying is available through NOTAM, directed traffic information to appropriate aircraft and, workload permitting, via a broadcast on the Flight Service area frequencies.

When pilots receive information from any of these sources to indicate the presence of military aircraft in their vicinity they should ensure that the military pilot is fully aware of their presence and that adequate separation can be maintained □

Airmanship, ladies and gentlemen, airmanship!

Commodore R N Partington, RAN

ALONG WITH HUNDREDS of other pilots, I had the pleasure of attending the airshow at Temora on Saturday, 27 April 1991.

In keeping with most such events, it was a relaxed affair where minimal ground control demanded a compensating requirement on the part of pilots to use their commonsense and exhibit good airmanship.

As is often the case, the display programme finished late and when this was combined with a group of VFR pilots in VFR aeroplanes trying to get home before sunset the scene was set for potential disaster.

Instead of everyone being patient and waiting their turn for take off, the departure turned into an aviation version of leaving the late show at the drive-in movies. At least three aircraft took an intersection departure at the same time as others were in the middle of their take-off roll using the full runway. Just to complete the shambles, pilots with radios who were rolling from the threshold proceeded to roundly abuse those who were not prepared to wait their turn. Of course, this brought the inevitable response from the guilty, in the good old Australian vernacular.

Ladies and gentlemen, I can forgive people who have a lapse of airmanship because they know no better or when an innocent mistake is perpetrated. At Temora however, I was subjected to a spectacle of repeated, blatant and premeditated disregard of commonsense and the most basic rules of airmanship. I do hope there are some people who are ashamed of their behaviour, for certainly we have no room in Australian aviation for this type of person.

Fortunately there were no funerals at Temora following this great Air Day, but it could so easily have been very different.

Anyone claiming to be a professional [*ie 'proficient'* — *ed*] would not have dreamed of an intersection departure in such circumstances.

'Airmanship' — it's not just a word, it's a way of life.

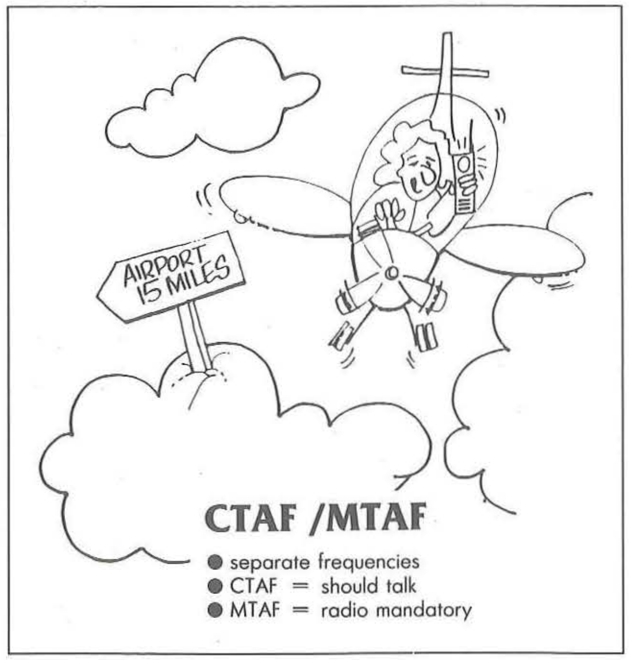
CAA comments:

Pilot discipline has been discussed at a number of recent Pilot Awareness Seminars. CAA Flying Operations Inspector Trevor Howie delivered a paper on just this subject at the Bankstown seminar on 20 April last.

With the devolution of much more responsibility for the management of individual flight to pilots, self-discipline and the desire to operate in accordance with established safety procedures becomes much more important; if we wish to retain a high level of safety in Australia it becomes essential.

Reports of the stupid actions of a small number of pilots at Temora have indeed reached this office. We are investigating each of them □

Say again all after...'



Bob Deavin, AMATS Project, CAA

EFFECTIVE USE of the radio is an important accessory to airborne safety. It is the means by which pilots can determine the whereabouts of other traffic, a valuable adjunct in the use of see and avoid procedures, and it is the medium by which advice and assistance can be given.

This does not mean a continual flow of words; on the contrary, often simply listening out will do the trick.

The new airspace arrangements being put into place by the CAA will not substantially alter the basic requirements for the carriage and use of radio, nor the basic way in which it is used. The rules that apply today at and above 5 000 ft will continue to apply (except of course that VFR aircraft will not be reporting to Flight Service), as will the use of radio around licensed aerodromes and selected authorised landing areas (ALAs).

Some of the new terms being introduced for use from December 12th 1991 include:

- **MTAF (Mandatory Traffic Advisory Frequency);**
- **CTAF (Common Traffic Advisory Frequency); and**
- **Unicom (Universal Communications).**

Normally, these frequency arrangements will all be used around aerodromes.

The reason for segregating local traffic operating at aerodromes, both licensed and nominated ALAs, from traffic on the en-route or area frequency, is to reduce radio clutter for overflying aircraft.

MTAF

In the first stage of implementation, AFIZs will be discontinued and MTAF areas used in their place. The procedures to be used will be similar to those used today, in that the carriage and use of radio is required (hence *Mandatory*). Inbound and other calls normally associated with non-controlled aerodromes will continue.

The significant differences, however, are that Flight Service will not be providing traffic information about VFR aircraft, and the MTAF will be on a different frequency from that being used by Air Traffic Services.

ATIS facilities used to provide elements of an Aerodrome Flight Information Service (AFIS), such as wind velocity, temperature, QNH, cloud and visibility at Flight Service manned non-controlled aerodromes, will continue to be available until such time as remote Flight Service Units are consolidated in the major centres.

CTAF

The same operating principle will apply to CTAF areas. The carriage of this frequency, although highly desirable, will not be mandatory. However, aircraft that can use this frequency will be required to monitor other traffic and advise relevant information.

GROUND TO AIR

These changes will mean that it will be necessary to make some calls twice, once for the benefit of local or inbound traffic operating on the MTAF/CTAF and again on the Air Traffic Services frequency if you wish to activate or cancel a Sarwatch or, for those aircraft operating on an IFR plan, to participate in a directed traffic information service.

Where possible, commonality will be sought for the frequencies to be used for MTAF and CTAF, so that as few as possible are involved.

In both MTAF and CTAF areas, the only mandatory calls will be 'taxi' and 'inbound'.

Other calls may be made at the pilot's discretion, if it is considered they will assist other traffic.

UNICOM

Unicom, on the other hand, is different, being defined as a **non CAA frequency or frequencies licensed by the Department of Transport and Communications, on which airport information may be provided at pilot request.**

Although the information may vary from place to place simply because local operators at aerodromes may have varying access to data, it is likely that the information will consist of some of the following:

- availability of public facilities;
- elements of weather information;
- wind direction;
- preferred runway or other local pecularities.

The use of any information provided by a Unicom service is at the discretion of the PIC. Where the Unicom is also the CTAF or MTAF, this will be identified either on the appropriate chart or in AIP ERSA, as will the locations, frequencies and times of operation of particular services.

The Unicom concept is not new. This type of arrangement has been used in Australia at a number of locations for quite a long time. The benefits lie in pilot access to up-to-date information and services.

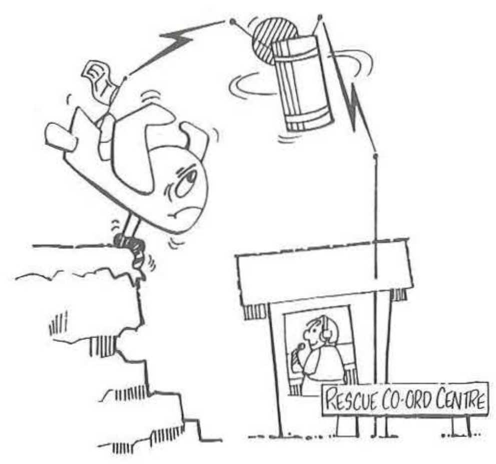
Because the CAA is not in a position to control the information provided, Unicom operators are solely responsible for the accuracy of any information passed to pilots.

Reporting and SAR

Changes to en-route procedures, particularly in terms of reporting, will be significant to those who currently elect to operate VFR on a Full Reporting basis. With the introduction of the new airspace arrangements, these procedures will not be available to VFR operations.

Current procedures are such that en-route reporting by pilots of VFR aircraft is just as much for traffic reasons as it is for search and rescue alerting. By removing the CAA's involvement in VFR traffic information, these reports are no longer required.

What this doesn't mean however, is that the search and rescue services available to all or any will be diminished, or that VFR aircraft operating outside controlled airspace will be prohibited from reporting or broadcasting their position.



No full reporting for SAR and VFR

Under the new scheme of things, pilots of VFR aircraft will be able to make broadcasts of their enroute positions, both for traffic reasons for other aircraft and for search and rescue purposes should it be necessary.

Broadcasts from VFR aircraft will be recorded electronically when in range of CAA VHF ground facilities or when HF is used.

GROUND TO AIR

Updates of weather or NOTAM information can be obtained on the relevant ATS frequency and emergency assistance will be available whenever required.

Without radio, access is lost to these services.

At the time of writing, the nuts and bolts of precisely how all the communications facilities will be arranged under the new system had not been finalised. However, the dimensions for CTAF and MTAF areas will usually be 5 nm/3 000 ft AGL and 15 nm/5 000 ft AGL respectively. Exceptions will be noted in ERSA.

Comprehensive data on all these aspects will be available in the AIP prior to implementation.

Example

The pilot of a typical VFR flight from say Roma in Queensland to Dubbo, NSW would give a broadcast call on the CTAF taxiing to advise other aircraft in the vicinity of the progress of the flight.

If the pilot requires the CAA to hold a Sartime for arrival at Dubbo and one had not been nominated previously, a call to Brisbane on the Flight Service frequency 126.0 MHz once clear of the CTAF area is all it takes. This is the frequency that the pilot would monitor for traffic purposes until the area VHF frequency changes to 126.8 Mhz around 30 nm north of St. George.

Depending on the altitude of the aircraft, it may be necessary to make inbound broadcasts on the St. George CTAF. In essence these calls will not vary much from the current broadcasts required from radio equipped aircraft when inbound or overflying a licensed aerodrome or Broadcast ALA below 5 000 ft, although they will be on a frequency different from that of the area frequency, so a change will be necessary.

Once south of St. George, clear of the CTAF area, it's back on to the area VHF frequency, making the appropriate enroute changes as the flight progresses.

An inbound call will be required approaching the boundary of the MTAF area (these areas will probably be depicted on charts in the same way as AFIZ are today). Once on the MTAF the pilot will be able to respond to other traffic to arrange separation, if required, making the usual calls on a broadcast basis entering the circuit area and positioning for landing.

Clear of the movement area, a change is necessary to call Flight Service on 123.9 Mhz to cancel the Sartime.

Summary

To some, unfortunately, merely the thought of using a radio is daunting.

No doubt some of this stems from the dread of not being quite up to speed with the latest procedures, or the associated jargon, or the fear of being criticised by Air Traffic Services staff when things slip off the rails a bit.

The new airspace management arrangements will place a large emphasis on pilot broadcasts, particularly in MTAF and CTAF areas, so, if necessary, think through and plan the calls you may need to make during the flight and don't delay making a call for the sake of not knowing precisely the right words.

Historically, the precedence associated with radio messages has been form, brevity then content.

Perhaps the emphasis should be now more directed to:

First: **Content** — get the message across;

Second: **Brevity** — keep it short — let others in;

Last: **Form** — make the call procedurally correct.

Always remember though that, whatever the environment, the use of the right words and procedures makes the going easier and safer for everybody. Most pilots know that if you receive information in the form that you are expecting, the 'process time' in your brain — and thus your reaction time — is dramatically diminished.

As with any major system change, pilot education will play an important role in properly preparing all aviators for the new airspace management arrangements.

This process has already commenced in some areas through pilot awareness seminars and briefings. Please take the time to read the various publications that will be produced during the run up to implementation □

NIL DEFECTS

Fake aircraft?

by Ralph Murphy, Senior Airworthiness Engineer, Structures

Flash!

Aircraft parts stolen to order

Millions of dollars' worth of discarded aircraft parts have been recycled and sold to airlines. The parts, some vital to passengers' safety, were stolen from British Airways and distributed through a world-wide network run by British businessmen.

Parts rejected by BA as too old, or because they could not be used on newer aircraft in its fleet, have been taken from warehouses at Heathrow over the past 10 years, then sold with false documentation or none at all and built into passenger planes all over the world. Some of the parts were 20 years old. A two-year investigation into the racket by detectives from Scotland Yard ended when seven men were sentenced at the Old Bailey. Two were jailed for three and two years respectively for masterminding the thefts and deceptions. They traded under many names, including Aviation Turbine Services and Inventory Trading.

Airlines are worried that their efforts to maintain safety were being undermined by the growing trade in stolen, salvaged or counterfeit spare parts which could fail and cause a catastrophic accident. There are fears that parts may slip through checking procedures, especially if accompanied by forged airworthiness documents, because engineers are under intense pressure to keep aircraft in the air. The Heathrow racket will add fears that the parts trade is getting out of control. The Scotland Yard team uncovered a forged log-book for a stolen aircraft auxiliary power unit — the first evidence of forged documents. As a result the [UK] CAA issued a notice to the aircraft industry warning operators of their responsibility to check the airworthiness of all parts in their aircraft. The CAA warned that distributors like those sentenced are not approved by them and are not required to have any technical expertise.

Among the millions of dollars worth of parts stolen were complete auxiliary power units. Other parts included hydraulic jacks which open and close aircraft doors, fuel-flow regulators which monitor fuel pressure, and important flight-deck electrical equipment.

An elaborate chain of off-shore companies was set up and the stolen parts were 'sold' between them to authenticate the parts by giving them a history. In fact, the transactions took place wholly on paper. The parts were then sold to airlines and other distributors, particularly in the US.

Flash!

Old plane parts sold as new: confession

Many of the world's top airlines and aircraft builders have been buying used and doctored aircraft parts, in the belief they were new, from a New York aircraft parts dealer.

The president of an aircraft corporation pleaded guilty to selling doctored parts to Europe's Airbus Industrie, British Airspace, Grumman, Sikorsky, Martin Marietta, Boeing Helicopters, Air France, United Airlines, Varig, TWA, American Airlines and PANAM, according to court records.

He also admitted selling used and doctored parts to the US and Israeli governments.

Attorneys for the Government and defendant both said no accidents were known to have resulted from the parts, which consisted mostly of altered and falsely certified rivets and other fasteners, distributed from 1977-1988. The accused faces a possible five-year prison term.

The Government said a two-year federal investigation established that the company had bought surplus parts from distributors, had them secretly stripped and replated or relubricated, and then had the certification documents from the original suppliers copied so their products could be passed off as new.

The prosecution said the fraud was possible because 'there's so much trust, if somebody gives you a part and it has a trademark on it, you believe that company did the work'.

The investigation stemmed from an anonymous tip from a company employee and was pursued by a special task force formed by the FBI and other government agencies.

(from newspaper reports)

TWISTING AN OLD DEFINITION, a fake aircraft is a collection of fake spare parts flying in close formation. Could you be flying one?

Counterfeit aircraft and engine parts and hardware, known as 'bogus' parts, present a serious world-wide problem to safe flying, and all aircraft are vulnerable. Quite often, the fake parts are the more expensive time-limited items, but be aware that large quantities of substandard nuts and bolts are out there too!

GA is obviously vulnerable, if even major airlines, as the newspaper reports show, get caught.

NIL DEFECTS

Look closely at the dash number of the Bell 47 model tail rotor driveshaft. It says -17 but the part is really a -5 that has been reworked. A rework that is not allowed. It still has the Bell Helicopter Textron acceptance stamps that were applied when the part was accepted as a -5.

As you can see, identification of bogus parts is not easy and in some cases — impossible!

What's so good about a genuine approved part?

Aircraft designers ensure all components function correctly, last long enough, are lightweight and cost-effective. Unauthorised manufacturers usually do not have access to the design drawings and material specifications, or know the processes needed, so it is quite possible that the unlicensed part will not do the job. And should the manufacturer be really unscrupulous, substandard materials and processes may be deliberately used merely to maximise profits.

Now this is pretty scarey stuff, and is why regulatory authorities exercise control on aircraft design and manufacture, in an attempt to stop the small percentage of conscienceless people from supplying parts likely to cause accidents and fatalities.

Airworthiness Engineering Branch acts on any information on bogus parts and where necessary issues Airworthiness Advisory Circulars [*these publications contain information most useful to pilots, LAMEs and aircraft owners; they may be obtained from the CAA Pubs Centre, and it is intended to update the index printed in ASD 142 shortly — ed*]. In especially dangerous cases, we issue Airworthiness Directives, which are mandatory requirements.

The problem is not confined to aircraft, but is general throughout manufacturing and construction industries. There is currently a Congressional inquiry in the USA and an international task force has been established on the industry-wide bogus-part problem.

Where do these unwelcome 'sub-standards' come from?

- Unauthorised copying, quite often inferior to the original.
- Salvage from wrecks or time-expired parts, cosmetically reworked to look like new.
- Ex-military parts, which have not been approved by the aircraft manufacturer for use on the civil version of the aircraft, or for which no genuine component history is available.
- Contract over-runs and rejects that 'somehow' find their way back into the system.
- Standard hardware not manufactured to specification or full quality inspection, or obtained from unknown sources.
- Substitution of commercial components; for example, bearings which look the same as the proper aircraft part, but haven't been selected or specially manufactured to fine tolerances etc.

It is important to understand that these parts are often accompanied by authentic-looking paperwork, which of course is counterfeit. An insidious problem is where sub-standard parts are deliberately mixed in with correct parts, this time, though, sharing the same correct paperwork.

Genuine or fake?

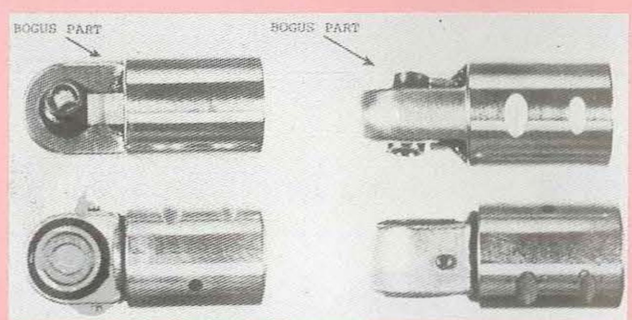
This is difficult to detect and may be almost impossible. However there are clues.

- Price is probably the most obvious. Be suspicious of 'cheap' components. Proper aircraft parts, produced and distributed to a full quality control system, cost money. Do not be afraid to ask the dealer why they are cheap.
- The higher up the authenticity ladder you deal (aircraft manufacturer being top, followed by accredited agent, then reputable dealer) the higher is your chance of getting genuine parts. Even so, the distributor may have been duped and thus is unaware that the parts are bogus.

NIL DEFECTS

- Always examine the paperwork, taking particular note of part numbers, serial numbers and how the actual part matches the documentation.
- Examine the part for any variation from the one you are replacing and for any evidence of rework or sub-standard workmanship or finish.
- Pay particular attention to unusual or missing number stamps and altered or unusual surface finish.
- Some bogus parts are detectable merely because they do not 'feel' right when the maintenance engineer fits them, often because they are too tight or too loose.

This is a Bell model 47 transmission centre case with a counterfeit stamp. Compare the oval of the stamp on the part to the one on the card under it.



The trunnion assembly, P/N 204-011-451-1, shown in the lower position of the photos, is approved for installation on Bell helicopter models 204B, 205A-1, 212 and 412. The other part is not FAA approved. The primary difference between the two parts is that the bogus part is a one-piece unit whereas the approved trunnion has a roller bearing in the upper subassembly which rotates 360°. Also, the approved trunnion contains two Zerk fittings in the upper assemble for lubrication, and the bogus part has no provision for lubrication.

This Bell model 47 clutch drum failed while pilot was taking off over a 125 foot cliff. Pilot's back was broken in three places. Clutch drum was determined to be bogus and found to have a thin wall in the area of the of the centre spline where the fracture occurred and which is obviously missing from this picture.

What to do?

If you have any suspicion about a part, or need guidance or help, and cannot resolve the doubt with the supplier:

- do not buy the part (or if already purchased and fitted do not allow the aircraft to be flown); and
- contact your nearest CAA Field Office immediately. A full examination of the component will be carried out, and if necessary, questions will be asked of the aircraft or parts manufacturer and even regulatory authorities overseas.

This article reinforces earlier *ASD* advice concerning bogus parts, and the CAA strongly appeals to everyone in the flying business to be aware of this particular danger to aviation. As it becomes increasingly difficult to separate customers from their dollars, we can expect that 'bargains', 'cheap components', 'military surplus parts', all of doubtful pedigree, will be offered for sale in mounting numbers □

These photos kindly supplied by Bell Helicopter Textron. Further information on BHT parts suspected as bogus can be obtained on Bell's USA Hotline (817) 280 3118.

Fuimus Troes, fuit Ilium et ingens gloria Teucrorum